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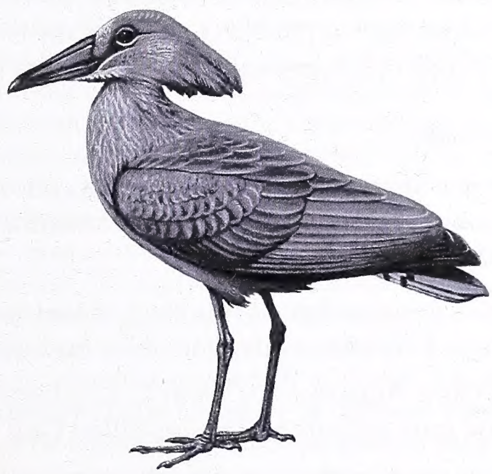

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Stable isotopes of soil collected from feet of two species of migratory *Acrocephalus* give clues to stopover sites

Elizabeth Yohannes, Gerhard Nikolaus and David J. Pearson

Summary

Soil samples were collected from the feet of Marsh Warblers *Acrocephalus palustris* and Reed Warblers *Acrocephalus scirpaceus* caught soon after crossing the Sudan Red Sea coast of Africa. We measured carbon ($\delta^{13}C_{soil\_feet}$) and deuterium (δD_{soil_feet}) isotope ratios in these soils with the objective of identifying possible take-off sites of these birds. We collected soils from three sites in the Caucasus region, a potential refueling area for the flight to Sudan, and from the Sudan Red sea coast, and compared their deuterium (δD_{soil}) with δD_{soil_feet}. There was a strong relationship between the arrival date of the birds and the isotope signatures ($\delta^{13}C_{soil\_feet}$ and δD_{soil_feet}) of the soil they carried. Results suggest that warblers from different geographical regions or of different age groups might use different staging sites before reaching the Sudan. Data for precipitation deuterium (δD_{prec}) together with δD_{soil} and δD_{soil_feet} suggest that while early arriving birds had taken off from southeast Europe (picking up soil from this region), those arriving later had stopped off in Arabia. This indicates an intrinsic difference in strategy between birds migrating at different times of the season. The isotopic compositions of biological tissues such as feathers have commonly been applied to track animal movement. But this is the first report of analysis of soil from birds' feet: a novel approach to isotopic study based on material picked up and carried by an animal externally.

Introduction

The Marsh Warbler *Acrocephalus palustris* breeds across the temperate Western Palaearctic and migrates through the Middle East and Arabia to reach southern Africa (Cramp 1992). It enters Africa across the Red Sea and is one of the most common migrants on the Sudanese coast in August and September (Nikolaus 1983, Nikolaus unpubl. data). Its main route to southern Africa passes through central and southeast Kenya (Dowsett-Lemaire & Dowsett 1987). It is one of a number of passerine species whose overall southward autumn migration is known to occur in "two stages". Birds migrate rapidly to northeast Africa, then interrupt their journey from two to three months in a stopover area before continuing to the southern Africa wintering grounds (see Pearson *et al.* 1988, Pearson 1990).

Earlier, we applied feather stable isotope studies to identify the potential stopover area of Marsh Warblers in northeastern Africa (Yohannes *et al.* 2005, Yohannes *et al.* 2007). These studies were based on the rationale that the stable isotope ratios of carbon ($\delta^{13}C$), nitrogen ($\delta^{15}N$) and non-exchangeable hydrogen (δD) become fixed in a feather during moult and should indicate the isotope composition of the area in which it grew. They were concerned specifically with the stopover area used during

the partial moult in northeastern Africa.

During the autumns of 1981 to 1984 many migratory birds were caught and ringed on the Sudan Red Sea coast (Nikolaus & Pearson 1982, Nikolaus 1983), including almost 10 000 Marsh Warblers. Among these a number of individuals were found to be carrying mud/soil on their toes and feet. Samples of these soils were collected from 21 individuals (11 in 1983 and 10 in 1984), and also from two Reed Warblers *Acrocephalus scirpaceus* (in 1983). These birds were caught soon after crossing the Red Sea coast. Thus, it is likely that the soil had been carried from a take-off site used well before entering Africa, holding an isotope signal of this site.

We determined stable carbon ($\delta^{13}C_{soil\_feet}$) and deuterium (δD_{soil_feet}) isotope ratios for these soil samples. Values would be expected to reflect the elemental composition of the local environment from which they were picked up. Plants assimilate CO_2 from the atmosphere into their tissues through different photosynthesis systems. Subsequent microbial decomposition of organic compounds in plant detritus incorporates the fixed carbon into the soil organic matter (SOM; Ehleringer 2000, Garten *et al.* 2000, Powers & Schlesinger 2002). There is a strong correlation between ^{13}C to ^{12}C ratios (expressed as $\delta^{13}C$) in plant communities and the $\delta^{13}C$ in the SOM (Balesdent *et al.* 1993). The relative carbon isotope ratios of the SOM are commonly preserved for several years (Boutton 1996). The carbon isotope ratios can then be used to evaluate the composition of the plant species and the isotopic signature of a particular site, such as a stopover site along an avian migration route.

Methods

Study site and fieldwork

During August and September 1983 and 1984 migratory Marsh Warblers were caught for ringing at a transit site on the Sudan Red Sea coast, Khor Arba'at (19°48′ N, 37°03′ E, 100 m; Fig. 1). The site is located about 15 km inland, immediately east of the Red Sea Hills. Except for a few bushes scattered along the Khor, (a small seasonal stream), the Arba'at region is generally characterized by harsh terrain and a highly variable rainfall with recurrent drought spells (Osman-Elasha *et al.* 2006). Vegetation in the surrounding desert is rather scarce. A small area of cultivated land with lemon, guava, and date palm trees provided the only green vegetation for many kilometres around. This "oasis-like" watered garden site appeared to be the first potential refuge for migratory birds that had crossed the Saudi Arabian desert and Red Sea. For more details of ringing here see Nikolaus (1983).

Migrants were caught during the morning, shortly after their arrival, with mist-nets located in the garden. Soil samples from the feet of 21 Marsh Warblers and two Reed Warblers were stored in a cool dry place until analysed. In August 2004, we returned to Khor Arba'at to collect soil samples from the upper 10 cm of the site.

From empirical data on the speed of migration (Yohannes *et al.* 2009a) and body mass (Yohannes *et al.* 2009b) of Marsh Warblers along the migratory path, we anticipated that the last potential refueling area before reaching the Sudan Red Sea coast could be in the Caucasus region of southeast Europe. It had indeed been noted that according to the weather maps of the time the arrival of mud-carrying birds was usually preceded some three days earlier by heavy thunderstorms in the Caucasus. Therefore, in May 2008 we collected soils (upper 10 cm) from three different sites in Azerbaijan (Fig. 1): Candy Cane Mountains, a semi-desert landscape near Alti Agac

(40°51′36″ N, 48°55′48″E); Besh Barmag, located in Khizi Rayon on the Caspian Sea shore (40°55′52″N, 49°14′ 8″E); and Shirvan National Park (39°32′51″N, 49°00′56″E). We measured the deuterium (δD soil) isotope ratio in these soils.

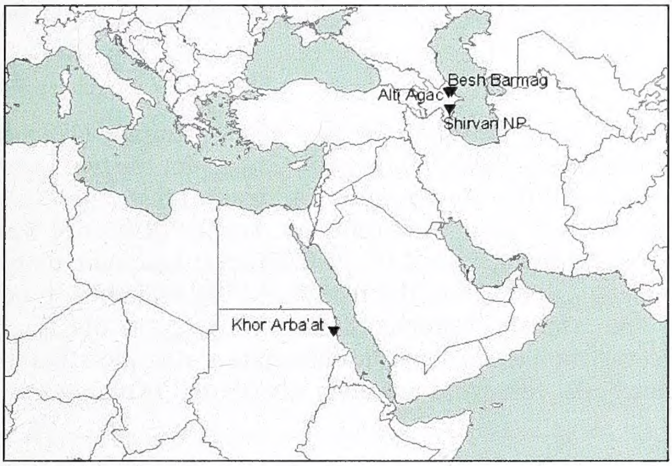

Figure 1. Study sites in the Caucasus and on the Sudan Red Sea coast.

Stable isotope analysis

Soil samples from the birds' feet were well mixed and ground on a roller mill to a fine powder and then dried at 550° C for 24 h. A sub-sample of approximately 5 mg was weighed into a capsule for determination of natural abundance $\delta^{13}C$ and non-exchangeable δD. We analysed soil samples from all 21 Marsh Warblers and the 2 Reed Warblers to determine their $\delta^{13}C$ values. We also analysed soil from 11 Marsh Warblers and one Reed Warbler for their δD values.

Stable isotope measurements are expressed in δ notation using the equation:

$$\delta X = [(Rsample/Rstandard) - 1] * 1000$$

where R is the corresponding isotope ratio X ($^{13}C/^{12}C$ or D/H) of the sample and standard.

Carbon and Deuterium

For carbon isotope analysis, soil samples (*c.* 0.5 mg) were weighed into 0.3 × 0.5 mm tin capsules to the nearest 0.001 mg, using a micro-analytical balance and then combusted in a Eurovector (Milan, Italy) elemental analyser. The resulting CO_2 was separated by gas chromatography and admitted into the inlet of a Micromass (Manchester, UK) Isoprime isotope ratio mass spectrometer (IRMS) for determination of $^{13}C/^{12}C$. These measurements are reported in δ ($\delta^{13}C$) relative to an international standard Pee Dee Belemnite (PDB).

For deuterium, soil samples (*c.* 0.35 mg) were placed on silver capsules and left open for a period of 3 days to allow sample exchangeable hydrogen to equilibrate with the moisture in the laboratory air. Deuterium (δD) measurements were performed by applying high-temperature pyrolysis using the same elemental analyser interfaced to an IRMS as described above, calibrated against standardized keratin and hydrocarbon reference materials. Further technical details of carbon and deuterium isotope analysis are given in Yohannes *et al.* (2011).

Regional precipitation δD

We checked whether our δD measurements from soils collected from the Caucasus and Sudan corresponded with published annual δD values in precipitation for these areas. To do so, we consulted precipitation δD values from the GNIPS/ISOHIS database (IAEA 2001) and isocline interpolated maps developed by Bowen *et al.* (2005) for Azerbajan and north Sudan.

Data analysis

Differences in $\delta^{13}C_{soil\_feet}$ and δD_{soil_feet} between the two years' samples (1983 & 1984) were tested using Student's t-tests. Mean values of $\delta^{13}C_{soil\_feet}$ for the two years (including the Reed Warbler data) differ significantly (Student's t-test: t_{21}=-2.58, p=0.02). Those of δD_{soil_feet} for the two years were different, but the difference was not statistically significant (Student's t-test: t_{10}=-2.05, p=0.07). In subsequent analysis, we therefore pooled the δD_{soil_feet} data from the two years. The relationship between capture date (arrival date) and soil isotopic values ($\delta^{13}C_{soil\_feet}$ or δD_{soil_feet}) was explored using Pearson correlation coefficients and bivariate scatter plots. Stable isotope variables of soils from birds' feet were normally distributed (Kolmogorov-Smirnov test, p>0.05).

Results

Carbon

The $\delta^{13}C_{soil\_feet}$ values for all samples taken from Acrocephalus warblers are shown as a scatter plot in Fig. 2. These ranged from *c.* -24 ‰ to *c.* -11 ‰, but increased significantly with capture date (1983: r=-0.64, p=0.02, n=13, and in 1984: r=-0.74, p=0.01, n=10). Analysis of 23 samples from 8 different days shows that values were significantly higher later in the season. Soils collected on 18 September 1983 are isotopically distinct (Mean $\delta^{13}C_{soil\_feet}$± SE, -13.3 ‰ ± 0.86, n=4) from those collected earlier that season (from both *Acrocephalus* species) between 22 August and 13 September (Mean $\delta^{13}C_{soil\_feet}$± SE, -21.8 ‰ ± 0.66, n=11). In 1984, soils collected between 7 and 26 September showed the higher $\delta^{13}C$ values (Mean $\delta^{13}C_{soil\_feet}$± SE, -13.8 ‰ ±0.48, n=8) whereas the almost identical value from two birds on 27 August was relatively low. In 1983, soils from the two Reed Warblers in mid-September gave similar values ($\delta^{13}C_{soil\_feet}$=*c.* -19.0 ‰) to those collected from Marsh Warblers at the same time, but higher than the samples from August.

Deuterium

δD_{soil_feet} values were lower in earlier arriving birds and became more enriched (higher) with later capture date (r=0.64, p=0.03, n=12), Fig. 3. They showed a large variation, ranging from *c.* -80 ‰ to -46 ‰. Overall, the mean value for δD_{soil_feet} for the Marsh Warblers was -62.2 ‰, the result for the one Reed Warbler -73.7 ‰, Fig. 3. The corresponding mean δD_{soil} values for samples from the Caucasus and from Sudan were -65.2 ‰ and -20.3 ‰, respectively. Within the soil samples from birds' feet there was a strong correlation between δD and $\delta^{13}C$ (r=0.90, p<0.001, n=12), Fig. 4.

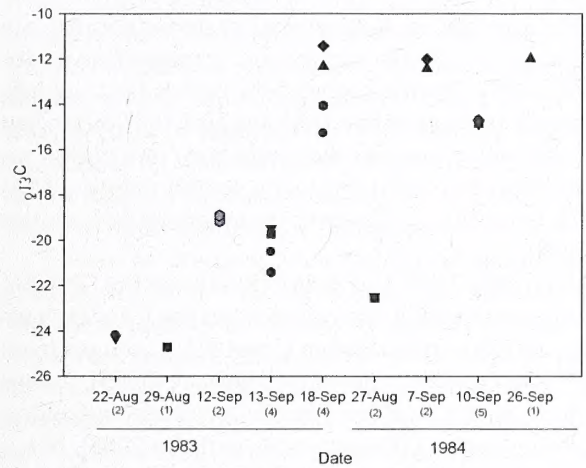

Figure 2. Carbon stable isotope ($\delta^{13}C_{soil\_feet}$) values of soils collected from 21 Marsh Warblers and 2 Reed Warblers (grey dots).

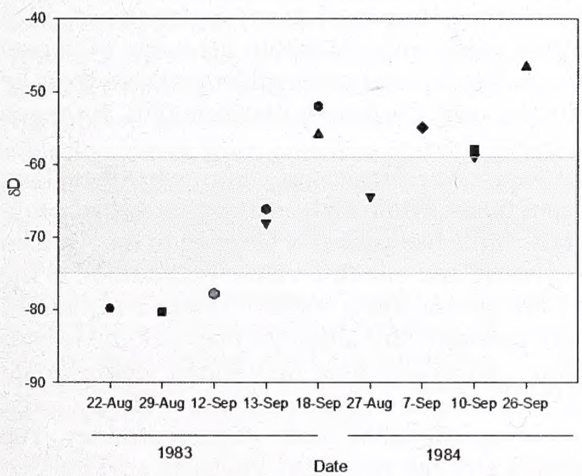

Figure 3. Hydrogen stable isotope (δD_{soil_feet}) values of soils collected from 11 Marsh Warblers and 1 Reed Warbler (grey dot) shown against capture date. The number of samples on each date is given in brackets.

The shaded region indicates the δD range of soils collected in Azerbaijan. NB: due to the limited amounts collected not all soil samples could be analysed for both elements.

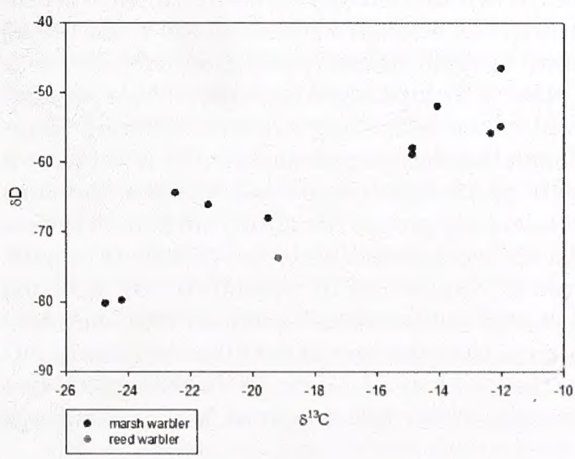

Figure 4. Relationship between soil carbon ($\delta^{13}C_{soil\_feet}$) and deuterium (δD_{soil_feet}) stable isotope values for samples collected from 11 Marsh Warblers and 1 Reed Warbler (grey dot).

Discussion

The $\delta^{13}C$ values of the soils collected from feet in August and early September are indicative of an ecosystem dominated by C3 plants, shrubs and grasses (mean approximately -27‰; Lajtha & Michener 2007). But the higher $\delta^{13}C$ values for the birds caught later in 1983 and all those caught in September 1984 suggest that these had stopped off in areas (Arabian Peninsula) with a more arid climate and/or a higher ratio of C4 to C3 plants. C4 plants have higher $\delta^{13}C$ values (mean approximately -13‰) than C3 plants (Smith & Epstein 1971). In addition, C3 plants have higher $\delta^{13}C$ values in arid areas (Ehleringer & Cooper 1988).

Global precipitation δD maps (Bowen *et al.* 2005) and predictions from the GNIPS/ISOHIS database (IAEA 2001) indicate expected δDprec values from the Caucasus region within the range -112‰ to -32‰. At sites on the Sudan Coast δD_{prec} ranges from approximately -31.0‰ to 32.0‰, and based on the maps of Bowen *et al.* (2005), values for the Red Sea coast overlap with those of the Arabian Pennisula. After controlling for fractionation of non-exchangeable hydrogen (Wassenaar & Hobson 2003), δD_{soil} values corresponding to these δD_{prec} data would be expected to range from -72.5‰ to -49.2‰ for soil from the Caucasus, and -53.95‰ to -12.3‰ for soil from Sudan. Our own δD soil measurements from Azerbaijan (mean -65.2) and Sudan (mean -20.3) are thus consistent with regional isotopic maps, and fall within the range predicted by the GNIPS/ISOHIS δD_{prec} database and the annual range given for these areas by Bowen *et al.* 2005. The δD_{soil_feet} of samples from the Marsh Warblers (Fig. 3) ranged from -80‰ (in August) to -42.2‰ (in September).

These δD results again suggest that Marsh Warblers staged at different areas along the migration route to Sudan at different times. While early arriving birds had probably used a site in southeast Europe later birds had probably stopped in the Arabian region. High seasonality and dynamic yearly and monthly values (in addition to the lack of standardized measurements from several sites) constrain our ability to use δD_{prec} to locate these staging sites more precisely. But although they lack the resolution required for accurate interpretation, values are based on ultimate isotopic data available for the Caucasus and Africa. Moreover, our determinations of δD_{soil_feet} and $\delta^{13}C_{soil\_feet}$ point to a similar conclusion regarding the birds' staging strategy. The similar values found for Marsh Warblers and the two Reed Warblers suggest that these species might have shared a common stopover area in mid-September 1983.

Observations and ringing recoveries have indicated that the entire Eurasian breeding population of the Marsh Warbler migrates through an Arabian route into Africa to reach a wintering range covering most of southeastern Africa (Dowsett-Lemaire & Dowsett 1987, Cramp 1992). But the different isotopic signatures found here presumably reflect a difference in strategy between birds crossing Arabia at different stages of the season. This might involve different breeding populations, and it is not known whether birds from eastern and western parts of the range reach Sudan at the same time. It might alternatively involve different age groups, for adults are known to pass through Khor Aba'at 7–10 days earlier on average than juveniles (Nikolaus unpubl. data). Eight of the birds caught between 27 August and 10 September 1984 were first year birds. The samples from 22 August 1983 and from late September 1984 were both from adult birds. Unfortunately, we do not have the ages of the other 1983 birds.

The difference found here between the earlier and later caught birds suggests two groups staging in isotopically distinct areas. But without regional isotopic soil maps

from stations along the migration route, it is impossible to know exactly where these locations are. The ringing of Marsh Warblers in Africa, mostly at Ngulia, Kenya, has produced about 30 recoveries of birds on passage during August and September. One staging area in Saudi Arabia is indicated by no less than eleven recoveries of Ngulia ringed birds in the vicinity of Buraydah, at 26–27°N, 44–45°E, dated 15 August–1 September (G. Backhurst & D. Pearson unpubl. data). But this might of course just reflect a local concentration of hunting activity, and this area lies to the east of the likely route of birds heading for the Sudan coast.

Recent techniques, such as light-level geo-location (e.g., Bairlein *et al.* 2012) and satellite tracking will be of immense assistance in revealing migratory pathways. But these tend to be expensive, which seriously restricts their application to continent wide studies. Chemical signatures such as stable isotopes present an alternative approach for tracking migrating animals. This has recently been applied to several migrant birds (Hobson 2003, 2011) including Marsh Warblers (Yohannes *et al.* 2005, 2007). It is usually the isotopic composition of tissues such as feather, blood or claw which is determined. The investigation reported here is based on material picked up and carried by the birds externally. This appears to be the first time that isotopic analysis of soil from birds' feet has been used to study migration. It suggests a new approach for tracking routes and staging areas, particularly applicable to birds that feed and walk on wetland areas, or those that feed on pollen and plant fruits. During capture and handling it may prove useful to collect for analysis samples of soil adhering to feet, fresh pollen or plant materials around the bill, or defecated insect or nectar remains. Such materials can be easily recognizable in quantities sufficient for isotopic investigation.

Acknowledgements

This study applied information based on data collected from several study sites and years. We acknowledge all those involved and thank all authorities and persons who helped us during field work. Financial support was provided by the Max-Planck Research Centre for Ornithology, Andechs. We thank Profs. Ellen Thaler, Herbert Biebach and the late Eberhard Gwinner for their support during the study.

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The Distribution of gull *Larus* species on the Red Sea coast of Sudan

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Summary

We present information on the status of gull species on the Red Sea coast of Sudan on the basis of observations made during a ten day visit to the region in January 2010. Seven gull taxa were recorded in this time. Sooty *Larus hemprichii*, Slender-billed *L. genei*, and Pallas's *L. ichthyaetus* Gulls were all widespread along the coast, with Sooty Gull being the most abundant species encountered. Our sightings confirmed Pallas's Gull as a winter visitor to this coast, and showed that Slender-billed Gull is widespread here. White-eyed *L. leucophthalmus*, Steppe *L. (cachinnans) barabensis*, Baltic *L. fuscus fuscus*, and Black-headed *L. ridibundus* Gulls were also encountered, but only around the harbours of Port Sudan and Suakin.

Introduction

The distribution of gull species along the Red Sea coast of Sudan is a matter of considerable uncertainty in the literature. Cramp & Simmons (1983) and Urban *et al.* (1986) depict the Sudanese coast as within the range of Sooty *Larus hemprichii*, White-eyed *L. leucophthalmus*, Black-headed *L. ridibundus*, and Lesser Black-backed *L. fuscus* Gulls. Cramp & Simmons (1983) additionally show the range of Herring Gull *L. argentatus* as including the Sudanese coast, although which of the several subspecies included within this taxon is involved is unclear. Del Hoyo *et al.* (1996) show the Sudanese coast within the breeding ranges of Sooty and White-eyed Gulls, and within the wintering ranges of Black-headed, Slender-billed *L. genei*, Yellow-legged (which they term *L. cachinnans*), Lesser Black-backed *L.f. heuglini* and Pallas's *L. ichthyaetus* Gulls. The maps in Sinclair & Ryan (2003) conform to those in Urban *et al.* (1986) in placing Sudan outside the ranges of Slender-billed and Pallas's Gulls, although they note a vagrant record of the latter from inland Sudan. Urban *et al.* (1986) describe both Slender-billed and Pallas's Gulls as vagrants to Sudan, apparently on the basis of records from the Khartoum area. Sinclair & Ryan (2003) also distinguish between Lesser Black-backed and Heuglin's *L. (fuscus) heuglini* Gulls, but only map the former as present along the Sudanese coast.

In the most comprehensive treatment of these taxa, Olsen & Larsson (2003) concur with del Hoyo *et al.* (1996) in placing the Sudanese coast within the breeding ranges of Sooty and White-eyed Gulls, and within the wintering ranges of Black-headed, Slender-billed and Pallas's Gulls. They place Sudan on the migration route of Lesser black-backed Gull, the Baltic Gull *L. fuscus fuscus*, and within the wintering range of Heuglin's Gull. The main winter area of the latter is described as the southern Red Sea, but with individuals distributed sparsely through the northern Red Sea. Olsen

& Larsson (2003) also depict the wintering range of *L. cachinnans* as overlapping the Sudanese coast, although in this context *cachinnans* refers to Caspian *L. c. cachinnans* and Steppe *L. c. barabensis* Gulls. Olsen & Larsson (2003) describe Caspian Gull as common in the Persian Gulf and UAE in winter, scarce south to Socotra, and probably present in the southern Red Sea. They describe Steppe Gull as mainly wintering in the Persian Gulf and Oman, but also along the coast of the Arabian Peninsula south to the south Red Sea.

Part of the confusion over which gull taxa are present on the Sudanese coast can be ascribed to taxonomic uncertainty, for example, with respect to the former Herring Gull (*cachinnans/barabensis/michahellis*) and Lesser black-backed Gull (*fuscus/heuglini*) complexes. However, the confusion can also be ascribed in part to a lack of primary information on the distribution of gull species in Sudan. The basis for the inclusion or otherwise of Sudan within the ranges of gull species in the monographs and handbooks cited above is unclear, and indeed Sudan barely receives direct mention in any of them. The most recent attempt at a comprehensive assessment of bird distributions in Sudan appears to be the atlas compiled by Nikolaus (1987) from published information and his own field data. Nikolaus (1987) records the following gulls on the Red Sea coast: Herring Gull *L. argentatus heuglini*, rare; Lesser Black-backed Gull *L. fuscus fuscus*, common on passage, uncommon in winter; Slender-billed Gull, uncommon; Sooty Gull, very common; Pallas's Gull, rare, recorded as a winter visitor but all dated records from March; White-eyed Gull, seasonally common; Mediterranean Gull *L. melanocephalus*, vagrant? two records; Little Gull *L. minutus*, rare, vagrant?; Black-headed Gull, locally very common, uncommon elsewhere. Since this atlas, very little information on Sudanese birds has been published, and coverage by resident or visiting birdwatchers has apparently been minimal.

In January 2010 we spent ten days on the Red Sea coast of Sudan as part of the range-wide survey of the Slender-billed Curlew *Numenius tenuirostris*, during which time we had the opportunity to observe gulls at a number of sites. Here, we summarize our observations, with the aim of providing additional information about the status of gull species along the Sudanese coast.

Locations

Figure 1 maps the locations of sites visited along the Red Sea coast of Sudan during our survey, with site names, GPS coordinates and visit dates given in Table 1. These sites were visited on the basis of their potential to house wintering Slender-billed Curlews, and were identified based on existing coastal IBAs (Fishpool & Evans 2001), IWC sites (Delaney *et al.* 2009), one previous record of Slender-billed Curlew from the Red Sea Coast (RSPB 2010a) and using Google Earth to identify other potentially suitable (*i.e.* saltmarsh, freshwater or freshmarsh) sites. These sites were carefully surveyed using visual searches with binoculars and telescopes. The coastal road in Sudan runs North–South through the Red Sea State *c.* 1–10 km inland. As far as possible the survey team stayed within sight of the coastline, allowing opportunistic stops at potentially suitable habitat along the route.

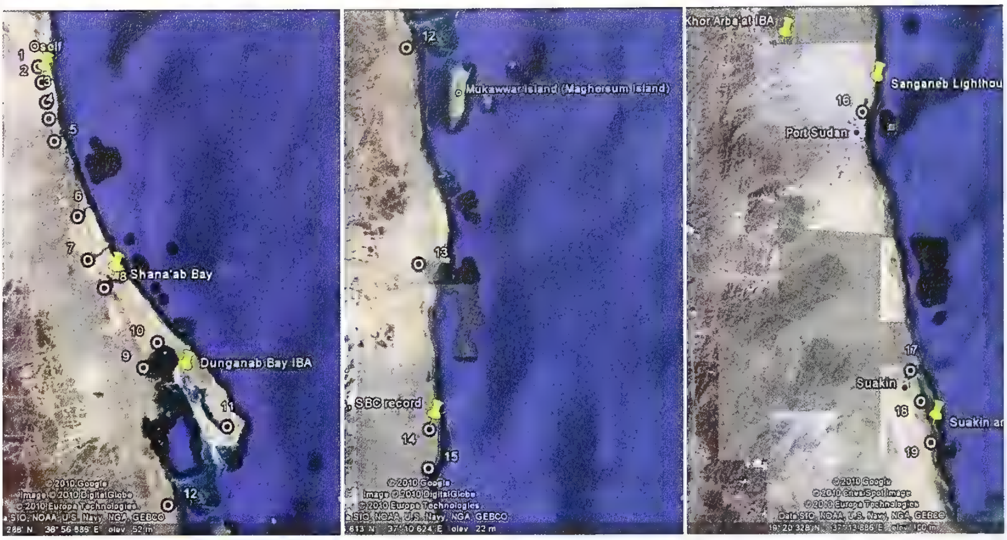

Figure 1. Sites visited in northern, central and southern sections of the Sudanese Red Sea coastline. Numbers refer to the numbers for sites given in Table 1.

Table 1. List of sites surveyed during to the survey of the Sudanese coasts, with GPS coordinates and date of visit.

Site #	Name	Coordinates	Date
1	Oseif – north	21°47.498'N, 36°51.643'E	21 Jan 2010
2	Oseif – south	21°45.610'N, 36°52.141'E	21 Jan 2010
3		21°43.184'N, 36°52.742'E	21 Jan 2010
4		21°41.144'N, 36°53.111'E	21 Jan 2010
5		21°38.398'N, 36°53.809'E	23 Jan 2010
6		21°29.246'N, 36°56.946'E	23 Jan 2010
7	Shana'ab Bay - north	21°23.923'N, 36°58.372'E	21 Jan 2010
7	Shana'ab Bay - north	21°23.923'N, 36°58.372'E	23 Jan 2010
8	Shana'ab Bay	21°20.490'N, 37°00.584'E	21 Jan 2010
9	Dunganab Bay IBA	21°10.761'N, 37°05.838'E	22 Jan 2010
10	Dunganab Bay IBA	21°13.862'N, 37°07.703'E	22 Jan 2010
11	Dunganab Bay IBA	21°03.568'N, 37°17.016'E	22 Jan 2010
12	Dunganab Bay IBA	20°53.992'N, 37°09.105'E	23 Jan 2010
13		20°27.625'N, 37°10.681'E	23 Jan 2010
14	Avons, bay	20°07.499'N, 37°12.078'E	20 Jan 2010
15	Avons, river mouth	20°02.744'N, 37°11.950'E	20 Jan 2010
16	Port Sudan	19°39.547'N, 37°14.188'E	23 Jan 2010
17	Suakin	19°08.170'N, 37°20.863'E	24 Jan 2010
18	Suakin Archipelago IBA	19°04.410'N, 37°22.295'E	26 Jan 2010
19	Suakin Archipelago IBA	18°59.413'N, 37°23.692'E	26 Jan 2010

Species

Sooty Gull *Larus hemprichii*

The most frequently encountered gull on the Sudanese coast, present in all bays and harbours visited from Oseif in the north to Suakin in the south (Plate 1). Numbers

varied from singles at Avons river mouth (site 15), to small flocks (e.g. *c.* 20 birds at Oseif (site 1) on 21 January). Sooty Gull was very common around the harbours at Port Sudan and Suakin (sites 16 and 17).

Plate 1. White-eyed Gull *Larus leucophthalmus*; left and Sooty Gull *L. hemprichii*, right at Suakin island, Sudan, on 24 January 2010.

White-eyed Gull *Larus leucophthalmus*

White-eyed Gull was much less widespread along the Sudanese coast than the superficially similar Sooty Gull. We only encountered this species around the harbours of Suakin (Plate 1) and Port Sudan (sites 16 and 17) on 24 and 25 January, respectively, and even here it was outnumbered around 10 to 1 by Sooty Gull.

Steppe Gull *Larus (cachinnans) barabensis*

Birds evidently of this taxon were the most frequently encountered of the large, "white-headed" gulls seen on the Sudanese coast (Plates 2–5), albeit only present around the harbours of Suakin and Port Sudan (sites 16 and 17). Birds we assigned to this taxon all possessed long, slender, parallel-sided bills, long, slender hind-quarters, and long, slender legs. The mantle colour of these birds appeared quite variable, depending on individual, lighting conditions, and perhaps age (the adults looking slightly darker than the 2nd year birds, e.g. Plate 2). However, all appeared darker-backed than Herring Gull, and in general were reminiscent of or darker than Yellow-legged Gull in shade (e.g. Plates 2–4).

Plate 2. Second winter (left) and adult (right) Steppe Gulls *Larus (cachinnans) barabensis* by the fish docks at Port Sudan, 25 January 2010.

Adult birds (Plates 2, 3) had bright yellow legs and bills, the latter with red gonys spots, and unstreaked heads. In flight, a broad white trailing edge to the wing was apparent, and the wing tip was extensively black, lacking the intrusion of paler tongues (Plate 3). The outermost primary (P10) had a small white mirror (Plate 3), and there were white primary spots visible in the folded wing. Primary moult was apparently complete in the adult photographed (Plate 3). Second winter birds had largely dark wing tips, pink legs, broad black subterminal bands on otherwise pale yellow bills, and unstreaked white heads (Plates 2 and 4). First winter birds (Plate 5) were pale and notably white-headed, exaggerated by a collar of brown streaks; they also showed all dark bills, long, pink legs, a clear contrast between the greyish mantle

and browner wings, a broad pale bar formed by the tips of the greater secondary coverts on the upperwing in flight, and a broad, solid black terminal band on an otherwise white tail. Eye colour varied from all dark to pale, becoming paler with age (*c.f.* Plates 2–5).

Plate 3. Adult (left) and 2nd ? winter (right) Steppe Gull *Larus (cachinnans) barabensis*, Port Sudan fish docks, 25 January 2010. The inset shows the same two birds.

Plate 4. Second? winter Steppe Gull *Larus (cachinnans) barabensis* by the fish docks at Port Sudan, 25 January 2010.

Plate 5. First winter Steppe Gull *Larus (cachinnans) barabensis* by the fish docks at Port Sudan, 25 January 2010 (far left). Both photographs are of the same individual.

Baltic Gull *Larus fuscus fuscus*

One bird seen at Suakin (site 17) on 24 January, and small numbers at Port Sudan (site 16) fish docks on 25th (Plate 6) were probably this taxon. These birds were very dark-backed, with relatively long primary projection beyond the tail. The adult bird depicted in Plate 6 shows fine brown streaking around the pale eye and a necklace of brown streaks, a tricoloured yellow bill with a black band and a small red gonydeal spot. This bird also has pale yellow legs, and restricted white spots on the folded wings.

Plate 6. Adult Baltic Gull *Larus (fuscus) fuscus* by the fish docks at Port Sudan, 25 January 2010. This bird bears a black plastic ring on the tarsus.

Plate 7. Adult Pallas's Gull *Larus ichthyaetus* at Avons (20° 7.499′N; 37° 12.078′E), Sudan, on 21 January 2010.

Pallas's Gull *Larus ichthyaetus*

A total of seven individuals of this distinctive species were encountered along the coast: one adult in the bay at Avons (site 14) on 20 January (Plate 7), one first winter at site 4 on 21st, 4 (2 adults, 2 second winters) at site 5 on 23rd, and one first winter at Suakin (site 17) on 24th. Thus, this species was present essentially along the entire surveyed length of the Sudanese coast, albeit in small numbers.

Black-headed Gull *Larus ridibundus*

A flock of around 30 birds on the mud at the estuary at Port Sudan (site 16) on 25 January constituted the only record during the coastal survey, although a solitary winter-plumaged adult was also seen at the confluence of the White and Blue Niles in Khartoum on 16 January.

Slender-billed Gull *Larus genei*

We encountered Slender-billed Gulls at more or less every coastal site surveyed from Oseif (site 1) in the north (Plate 8) down to mangroves south of Suakin (site 19), although always in small numbers (usually one or two birds per site). All birds seen were adults.

Plate 8. Slender-billed Gull *Larus genei*, centre with Sooty Gulls *L. hemprichii* and Crested Tern *Sterna bergii*, in flight at Oseff, Sudan, on 21 January 2010.

Discussion

Our survey of the Sudanese coast in January 2010 was brief and by no means comprehensive. Our observations were concentrated on areas of mud, mangrove and marsh around bays and inlets, and also any areas of freshwater we encountered, as these habitats were judged most likely to harbour Slender-billed Curlew, the focal species of the survey. Most of the Sudanese coastline consists of a narrow strip of sand between either raised ancient reefs or desert, and much of it is fringed with extant coral reef. We largely ignored such stretches, and in consequence have few observations of birds by or over open sea. Nevertheless, such is the paucity of recent observations from the Sudanese coast that even our relatively limited visit helps to clarify uncertainties about the distributions of gull species along it.

Nikolaus (1987) noted that Pallas's Gull had been recorded as a winter visitor to the Red Sea coast of Sudan, but that all dated records from the coast and from Khartoum were from March. Our observations showed that Pallas's Gull was widespread along

the Sudanese coast in January 2010, and that this species presumably is indeed a winter visitor there, albeit in small numbers. The same can also be said of Slender-billed Gull, which Nikolaus (1987) recorded as an uncommon winter visitor only in the vicinity of Port Sudan and Suakin, but which is clearly widespread along the Sudanese coast. These observations confirm the distributions of these two species in Sudan as depicted in the range maps of del Hoyo *et al.* (1996) and Olsen & Larsson (2003).

We also observed individuals from at least two of the large, white-headed gull taxa in the Herring and Lesser-black backed complexes, but both only in the vicinity of Port Sudan and Suakin harbours. The specific status of forms within these complexes is uncertain, and their identification is difficult and in some cases currently unresolved (Olsen & Larsson 2003). Previous handbooks and monographs (Cramp & Simmons 1983, Urban *et al.* 1986, Grant 1986, del Hoyo *et al.* 1996, Olsen & Larsson 2003) suggest that three taxa from this group might be present on the Sudanese coast in winter—Caspian, Steppe, and Heuglin's Gulls. The majority of individuals of the large, white-headed gulls present were consistent with identification as Steppe Gull. Plates 2 and 3 show adults, Plates 2 and 4 presumed third winter, Plate 3 a presumed second winter, and Plate 5 a first winter bird ascribed to this taxon. The criteria for separating Steppe from Caspian and Heuglin's Gulls are evidently not well understood, but the Sudanese birds seem more likely to be Steppe on the basis of mantle colour, overall shape, and plumage details of individual birds (Olsen & Larsson 2003). Steppe Gull mainly winters in the Persian Gulf and Oman, although it also apparently occurs south along the coast of the Arabian peninsula to Socotra and the southern Red Sea, and east to the coast of India (Olsen & Larsson 2003). The breeding range of Caspian is to the west of that of Steppe, while several thousand Caspian Gulls winter in Israel, reaching peak numbers in January and February (Olsen & Larsson 2003). Thus, while Caspian Gull might be expected to occur in Sudan, our observations suggest that Steppe Gull may, in fact, be the more common of the two forms along this coast.

A fourth large, white-headed gull taxon, Baltic Gull, is known to migrate through the Red Sea to wintering grounds in Africa, and it is possible that stragglers might be encountered wintering in Sudan. Of the two dark-backed large gull taxa previously recorded from Sudan (Nikolaus 1987), individuals observed at Suakin and Port Sudan more closely matched Baltic than Heuglin's Gull. These birds were relatively large and heavy set, and while not as dark-backed in life as Plate 6 would suggest, they were too dark to be Heuglin's Gull. Nikolaus (1987) records Heuglin's Gull (as *Larus argentatus heuglini*) as a rare winter visitor to the Port Sudan region, while Olsen & Larsson (2003) describe its wintering range as mainly in the southern Red Sea but with individuals sparsely as far north as Eilat in Israel. Our observations would suggest that Baltic Gull is probably regular in winter in Sudan, and that previous records of Heuglin's Gull from the Sudanese coast may conceivably relate to Steppe Gull.

White-eyed Gull is resident along the Red Sea coast, breeding on offshore islands. Previous surveys estimated the breeding population on islands along the Sudanese coast at 300–1000 pairs (BirdLife International 2011, Moore and Balzarotti 1983). The species is threatened by introduced predators on the breeding islands (e.g., rats *Rattus* sp.) and from floating and beached oil-spills, and is also under pressure from egg- and chick-collecting, disturbance by fishermen and tourists (and related building) and oil exploration. The species is listed as Near Threatened because it is expected to experience a moderately rapid population decline in the next three generations (33

years) as a consequence of these threats (BirdLife International 2011). On this survey, White-eyed Gulls were seen only around Port Sudan and Suakin, and repeat surveys revisiting the sites surveyed by Moore & Balzarotti (1983) would seem to be a priority for improving understanding of the conservation status of this species (PERSGA 2003).

In conclusion, we recorded seven gull taxa along the Sudanese coast in the course of a ten-day survey visit. Sooty, Slender-billed and Pallas's gulls were all widespread along the coast, with the first of these being by far the most abundant species encountered. Our sightings confirm Pallas's Gull as a winter visitor to this coast, and show also that Slender-billed Gull is more widespread than suggested from the Sudanese bird atlas (Nikolaus 1987). White-eyed, Steppe, Baltic, and Black-headed Gulls were encountered on the coast only around the harbours of Port Sudan and Suakin. As far as we are aware, this is the first time that Steppe Gull has been reported from Sudan, although this may reflect the difficulties of identifying this taxon rather than any change in status. White-eyed Gull is categorized as Near-Threatened by the IUCN, and further investigation of its status in Sudan is a priority, especially given our low frequency of encounters with this species.

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Preliminary observations on the avifauna of Ikokoto Forest, Udzungwa Mountains, Tanzania

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Summary

A study was conducted at *c.* 110 ha of Ikokoto forest using mist-netting and general field observations. Sixty-four species were recorded of which 61% were of conservation importance in terms of forest dependence. All species were found to belong to the familiar assembly of the large Udzungwa forests. Six species, the Green-throated Greenbul *Andropadus fusciceps*, Spot-throat *Modulatrix stictigula*, African Tailorbird *Artisornis metopias*, Black-lored Cisticola *Cisticola nigriloris*, Uhehe Fiscal *Laniarius marwitzi* and Fülleborn's Black Boubou *Laniarius fuelleborni* detected are restricted range and one species Moreau's Sunbird *Nectarinia moreaui* is near-threatened according to IUCN threat status. The presence of many species which are forest dependent in this tiny forest indicates that this site, though small in size and highly fragmented, retains significant conservation value for birds.

Introduction

Ikokoto Forest lies in the northeast part of the Udzungwa Mountains, southern Tanzania. The latter form the southernmost and largest block of the Eastern Arc Mountains, which are known globally for extraordinarily high levels of endemism, largely attributed to their ancient geological age and long-term climatic stability (Lovett & Wasser 1993). Like many other Eastern Arc Mountain forests, Ikokoto forest is fragmented; it covers the peaks of two hills, which are surrounded by farmland matrix and isolated from other forest patches. Both fragments are under pressure from hunting, agriculturalist conversion, timber felling, and extraction of other wood products such as building poles and fuel wood.

In July 2009 we visited this forest to make sound recordings of, and perform playback experiments to, Fülleborn's Sunbird *Nectarinia fuelleborni*. During our time there we also mistnetted and made opportunistic observations of the avifauna. In this paper we report the results of this informal survey carried out over the course of 10 days. Despite extensive accounts of the avifauna in the Udzungwa Mountains in what are at present protected areas (Dinesen *et al.* 1993, Fjeldså 1999, Jensen & Brogger-Jensen 1992, Stuart *et al.* 1981, Stuart *et al.* 1987), we did not have any previous information on the structure of the avian community at the Ikokoto forest. To the best of our knowledge this paper is the first published attempt at documenting the avian community in this forest.

Materials and methods

Study area

The two patches that make up Ikokoto forest are located at 7°41′S, 36°06′E about 10 km north-east of Ilula town, just south of the Iringa – Dar es Salaam Road in Kilolo District, Iringa Region (see Fig. 1). This area was previously recommended for inclusion in a potential forest reserve (referred to as Kitonga Forest Reserve, Moyer 1992), but that reserve was never established (D. Moyer, pers. comm.). The fragments are located at elevation ranging from 1664–1954 m and comprise approximately 110 ha of montane forest (Moyer 1992), which is severely fragmented as a result of agricultural activities in the surrounding matrix. A recently built road passes from the upper part of Ikokoto village east through the major forest fragment, and eventually to the mobile phone towers that are visible from the Kitonga Gorge pass. The other forest patch, west of the upper part of Ikokoto village, is reached by foot from agricultural land just south of the village.

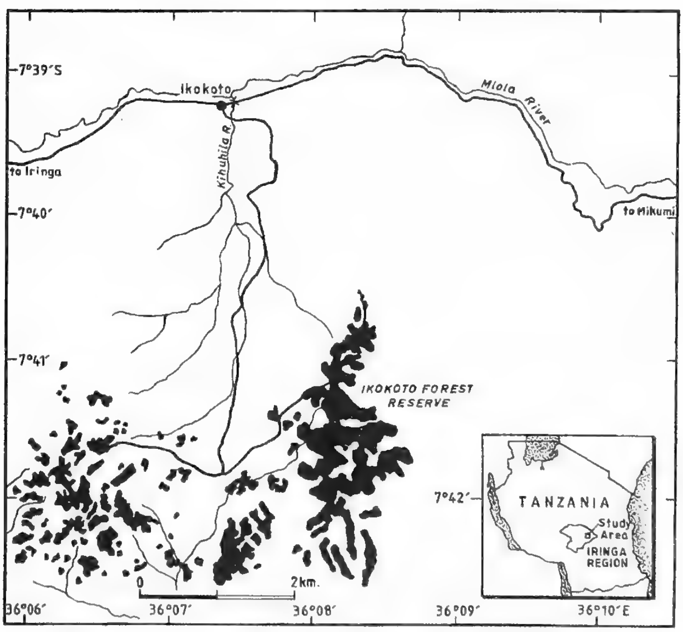

Figure 1. Location of Ikokoto village-managed forest.

Methods

Birds were surveyed opportunistically using a combination of mistnets and general observations from 12–21 July 2009. All the authors were familiar with montane forest-dependent birds through fieldwork at various locations within the Eastern Arc Mountains. All birds seen or heard well were noted individually by each of the authors over 10 days of fieldwork. The primary focus of the fieldwork involved making sound recordings of particular focal species, capturing focal species using mist nets, and playback experiments to Fülleborn's Sunbird. General avifaunal surveys were a secondary objective, and therefore should not be treated as exhaustive or systematic surveys. We set four mist nets each 12 m long, 3 m high, and with a mesh size of 16 mm for a total of approximately 18 h making a total of 864 metres-net-hours. At all

times during mistnetting, at least two nets were positioned at the forest edge near flowering shrubs (including *Leonotis* sp.) to target sunbird captures. The remaining one to two nets were placed in the forest understorey.

We classified species according to their dependence on forest habitat using Bennun *et al.* (1996) and Romdal *et al.* (2003) where forest specialists are species that depend on the forest for their survival. Generalists are those species which frequent forest but also exist in alternate habitats. Taxonomy and nomenclature follow Britton (1980) with exception of the following species: African Wood Owl *Strix woodfordii* (where we used Fry *et al.* 1988), Richard's Pipit *Anthus novaeseelandiae* (we used Keith *et al.*, 1992), White-tailed Crested Flycatcher *Elminia albonotata,* White-eyed Slaty Flycatcher *Melanornis fischeri,* African Grey Flycatcher *Melaenornis microrhynchus,* African Tailorbird *Artisornis metopias,* Black-lored Cisticola *Cisticola nigriloris* and Evergreen Forest Warbler *Bradypterus lopezi* (where we used Urban *et al.*, 1997), and Tropical Boubou *Laniarius aethiopicus* where Fry and Stuart (2000) were used.

Results

We recorded 64 species representing 28 families. A full list of birds recorded both in mist nets and using observations is shown in Appendix 1. Of the 64 species, 39 (61%) are of conservation importance in terms of forest dependence (both FF and F categories, Appendix 1). Of these 37 species, 59% (22 species) are strict forest dependent species (category FF) that cannot survive deforestation.

Despite the fact that mist netting effort was low, 40 individual birds in 13 species were captured. The most abundant in terms of catch rate was Fülleborn's Sunbird (Table 1). The other abundant species were Green-throated Greenbul *Andropadus fusciceps* and Forest Batis *Batis mixta.* Other species mist netted had low catch rates represented by one or two individuals.

Table 1. Species mist netted at Ikokoto forest.

Species	No. of individuals	Catch rate (per 1000 metres-net-hours)
Cabanis (Placid) Greenbul *Phyllastrephus cabanisi*	1	1.2
Green-throated Greenbul *Andropadus fusciceps*	5	5.8
Shelley's Greenbul *Andropadus masukuensis*	1	1.2
White Starred Forest Robin *Pogonocichla stellata*	2	2.3
Forest Batis *Batis mixta*	4	4.6
African Hill Babbler *Psedoalcipe abyssinica*	1	1.2
African Tailorbird *Artisornis metopias*	2	2.3
Bar-throated Apalis *Apalis thoracica*	2	2.3
Uhehe Fiscal *Lanius marwitzi*	1	1.2
Fülleborn's Sunbird *Nectarinia fuelleborni*	18	20.8
Variable Sunbird *Cinnyris venustus*	1	1.2
Fülleborn's Black Boubou *Laniarius fuelleborni*	1	1.2
Red-faced Crimsonwing *Cryptospiza reichenovii*	1	1.2

Discussion

Our results show that Ikokoto forest supports a fairly rich avifauna despite its small size. The bird species composition observed at this forest reveals that all species

belong to the familiar assembly of the larger Udzungwa Mountain forests, including the characteristic restricted-range species Green-throated Greenbul, Spot-throat *Modulatrix stictigula*, African Tailorbird, Black-lored Cisticola, Uhehe Fiscal *Lanius marwitzi* and Fülleborn's Black Boubou *Laniarius fuelleborni* (Fjeldså *et al.* 2010) and Moreau's Sunbird *Nectarinia moreaui* which is Near-Threatened according to IUCN (www.iucnredlist.org). However, some species which occur in other surveyed north-eastern Udzungwa forests (e.g. Nyumbanitu, Mwahihana, Luhombero, Ndundulu, etc., see Fig. 1) were not observed, including Rufous-winged Sunbird *Nectarinia rufipennis*, Swynnerton's Robin *Swynnertonia swynnertoni*, White-winged Apalis *Apallis chariessa and* Dappled Mountain *Robin Arcanator orostruthus* (Stuart *et al.* 1981, Stuart *et al.* 1987, Jensen & Brøgger-Jensen 1992, Dinesen *et al.* 1993, Dinesen 1998, Dinesen *et al.* 2001, Butynski & Ehardt 2003, Fjeldså *et al.* 2010). This could be due to the size of Ikokoto forest being small, as smaller fragments are known to contain fewer species than larger-sized fragments (Newmark 1991). The other reason could be due to low sampling effort as the number of days spent in the field were few.

Because of the low mist netting effort the numbers of species and individuals mist netted were low. The high catch rate of *N. fuelleborni* is due to the fact that we essentially set mist nets wherever we located the calling male sunbirds as the main objective of the study was to record and catch them.

Based on this preliminary survey at Ikokoto forest, we suggest that the forests of the Udzungwa are likely to exhibit the nested subset pattern widely reported across a diversity of similar patchy or island-like habitat distributions (Cordeiro, 1998). Species composition shows that Ikokoto forest belongs to the assembly of the entire Udzungwa Mountains range (Stuart *et al.*, 1987, Jensen & Brøgger-Jensen 1992, Fjeldså *et al.* 2010). In fact, the Udzungwa forests represent a desirable intermediate geographic scale for nestedness analysis between the two scales thus far examined for Eastern Arc birds: smaller-scale anthropogenic fragmentation in the East Usambara Mountains (Newmark 1991) and the larger-scale habitat islands represented by the Eastern Arc's major mountain blocks (Usambara, Udzungwa, Uluguru, etc.; Cordeiro 1998). Across these three scales, a comparative investigation of community nestedness (e.g. the degree to which one community is a subset of another) and individual species occupancy may provide valuable insight that could link population-level processes (e.g. stochastic local extirpation, persistence, gene flow) with emergent evolutionary biogeographic patterns (e.g. divergence, extinction). This calls for further surveys both during cold and hot seasons at Ikokoto forest.

Conservation implications

The results from this study indicate that despite the fact that Ikokoto forest is small, it is still important for conservation of birds and possibly other fauna groups. The presence of many forest-dependent bird species at Ikokoto, including range-restricted forest understorey taxa (e.g. Spot-throat), is a sign that this area retains significant conservation value despite its extensive fragmentation. This implies that the remaining forest is worthy of careful conservation and management measures to guarantee its long term survival.

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Appendix 1. Bird species found in Ikokoto Forest, Udzungwa Mountains (FF = species which are strictly confined to the forest, F = species which mainly depend on the forest but can be found outside the forest. Species with blanks in forest dependence category are non-forest species).

Species	Category
African Goshawk *Accipiter tachiro*	F
Little Sparrowhawk *Accipiter minullus*	F
Augur Buzzard *Buteo augur*	
Common Buzzard *Buteo buteo*	
Scaly Francolin *Francolinus squamatus*	F
Lemon Dove *Aplopelia larvata*	FF
Olive Pigeon *Columba arquatrix*	FF
Red-eyed Dove *Streptopelia semitorquata*	
Livingstone's Turaco *Tauraco livingstonii*	F
White-browed Coucal *Centropus superciliosus*	
African Wood Owl *Strix woodfordii*	F
Fiery-necked Nightjar *Caprimulgus pectoralis*	F
Speckled Mousebird *Colius striatus*	
Crowned Hornbill *Tockus alboterminatus*	F
Yellow-rumped Tinkerbird *Pogoniulus bilineatus*	F
Olive Woodpecker *Mesopicos griseocephalus*	FF
Lesser-striped Swallow *Hirundo abyssinica*	
Grassland Pipit *Anthus novaeseelandiae*	
Common Bulbul *Pycnonotus barbatus*	
Cabanis's (Placid) Greenbul *Phyllastrephus cabanisi*	FF
Green-throated Greenbul *Andropadus fusciceps*	FF
Shelley's Greenbul *Andropadus masukuensis*	FF
White-chested Alethe *Alethe fuelleborni*	FF
White-starred Forest Robin *Pogonocichla stellata*	FF
Olive-flanked Robin Chat *Cossypha anomala*	FF
Red-capped Robin Chat *Cossypha natalensis*	F
Stonechat *Saxicola torquatus*	
Ashy Flycatcher *Muscicapa caerulescens*	F
White-tailed Crested Flycatcher *Elminia albonotata*	FF
White-eyed Slate Flycatcher *Melaenornis fischeri*	F
African Grey Flycatcher *Melaenornis microrhynchus*	
Forest Batis *Batis mixta*	FF
Spot-throat *Modulatrix stictigula*	FF
African Hill Babbler *Psedoalcippe abyssinica*	FF
White-bellied Tit *Parus albiventris*	
African Tailorbird *Artisornis metopias*	FF
Black-lored Cisticola *Cisticola nigriloris*	
Red-faced Cisticola *Cisticola erythrops*	
Brown-headed Apalis *Apalis alticola*	F
Evergreen Forest Warbler *Bradypterus lopezi*	FF
Kretschmer's Longbill *Macrosphenus kretschmeri*	FF
Bar-throated Apalis *Apalis thoracica*	FF
Uhehe Fiscal *Lanius marwitzi*	
Yellow White-eye *Zosterops senegalensis*	F

Species	Category
Collared Sunbird *Anthreptes collaris*	F
Moreau's Sunbird *Nectarinia moreaui*	FF
Fülleborn's Sunbird *Nectarinia fuelleborni*	FF
Malachite Sunbird *Nectarinia famosa*	
Olive Sunbird *Nectarinia olivacea*	FF
Variable Sunbird *Nectarinia venusta*	
Black-backed Puffback *Dryoscopus cubla*	F
Many-coloured Bushshrike *Malaconotus multicolor*	FF
Black-headed Tchagra *Tchagra senegala*	
Fülleborn's Black Boubou *Laniarius fuelleborni*	FF
Grey-headed Bushshrike *Malaconotus blanchoti*	
Tropical Boubou *Laniarius aethiopicus*	
White-necked Raven *Corvus albicollis*	
Baglafecht Weaver *Ploceus baglafecht*	
Red-faced Crimsonwing *Cryptospiza reichenovii*	F
Peters's Twinspot *Hypargos niveoguttatus*	F
African Firefinch *Lagonosticta rubricata*	
Yellow-bellied Waxbill *Estrilda melanotis*	
African Citril *Serinus citrinelloides*	
Yellow-rumped Seedeater *Serinus atrogularis*	

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East Africa's diminishing bird habitats and bird species

Donald A. Turner

Forests, wetlands and grasslands the world-over are currently under direct threat as all countries faced with rapidly increasing human populations strive to improve their agricultural potential. East Africa is no exception and today with populations reaching unprecedented and possibly unsustainable levels, our natural habitats are under their greatest pressures. As a result, several bird species face potential extinction, and in some cases have already entered that final state.

East Africa is one of several centres of endemism in Africa, and boasts no fewer than 51 bird species occurring *only* in our relatively small region—Kenya, Tanzania, Uganda, Burundi and Rwanda. While Tanzania is clearly at the centre of East Africa's endemism with 60 per cent of all the endemics occurring within its national boundaries, it is imperative and incumbent upon all countries to give the highest possible attention to ensure that critical habitats where endemic species occur are afforded the maximum possible protection. The drawing up and subsequent publication of Important Bird Areas was a major step forward in identifying such areas in Kenya, Uganda and Tanzania (Bennun & Njoroge 1999, Byaruhanga *et al.* 2001, Baker & Baker 2002).

Endemism is an indication of the richness of any region's or country's biodiversity and, coupled with a network of protected areas, the East Africa region is rich in both. Over a thousand bird species have been recorded in each of our three largest countries (Kenya, Tanzania and Uganda), a statistic equalled only by the DR Congo, and vast areas of East Africa are currently gazetted as either National Parks, Game or Forest Reserves.

Forests, wetlands and grasslands are three of the world's major global habitats, ranking alongside the oceans in terms of the surface area of the planet. They are by far the most important habitats for bird and mammal species in East Africa, and as such, many have become some of the world's greatest tourist attractions, resulting in vital foreign exchange earnings for each national exchequer.

However, recent national census records have indicated human population increases in all countries, and in Kenya in particular a steep rise that is already sending alarm bells ringing both locally and internationally. In short, Kenya appears to have fast outstripped its carrying capacity, as a result there is now an acute shortage of both arable and grazing lands. This in turn has placed unprecedented pressures on all forests, wetlands and grasslands as populations seek to acquire sufficient land for their immediate needs, and as every year passes we witness important bird habitats shrinking in the face of burgeoning re-settlement schemes and the resultant intensive agricultural projects that follow. Such impacts have resulted in a decline in both bird habitats and biodiversity.

Of particular concern are the areas important to all our endemic bird species, and already we are witnessing a series of very worrying developments. Taking each

country in turn we can clearly see the effect of such unplanned developments and the subsequent degradation of important bird habitats and its effect on several species that are so dependent upon them.

Kenya

Category A species: Endemic species occurring *only* in Kenya

Jackson's Francolin *Francolinus jacksoni*
Central Highland Forest species

Williams's Lark *Mirafra williamsi*
Northern desert areas. **Data Deficient**

Aberdare Cisticola *Cisticola aberdare*
Endangered Highland Grassland species

[Tana River Cisticola *Cisticola restrictus*]
Considerable doubt exists regarding the validity of this taxon

Hinde's Babbler *Turdoides hindei*
Vulnerable in several central areas

Taita Thrush *Turdus helleri*
Critically Endangered Taita Hills Forest species

Clarke's Weaver *Ploceus golandi*
Endangered Coastal Forest species

Sharpe's Longclaw *Macronyx sharpei*
Endangered Highland Grassland species

Category B species: EA endemic species shared with Tanzania

Sokoke Scops Owl *Otus ireneae*
Endangered Coastal Forest species

Grey-crested Helmetshrike *Prionops poliolophus*
Near Threatened *Acacia* woodland species

Red-throated Tit *Parus fringillinus*
Widespread throughout Masailand

Northern Pied Babbler *Turdoides hypoleuca*
Savannahs, *Acacia* woodlands and suburban gardens

Hidebrandt's Starling *Lamprotornis hildebrandti*
Acacia savannahs

Abbott's Starling *Cinnyricinclus femoralis*
Vulnerable Highland Forest species

Kenrick's Starling *Poeoptera kenricki*
Localized Highland Forest species

Amani Sunbird *Hedydipna pallidigaster*
Endangered Forest species

Tsavo Sunbird *Cinnyris tsavoensis*
Commiphora and *Acacia* thornscrub

Rufous-tailed Weaver *Histurgops ruficauda*
Acacia savannahs

Taveta Golden Weaver *Ploceus castaneiceps*
Swamps and bush around the base of Mt Kilimanjaro

Jackson's Widowbird *Euplectes jacksoni*
Near Threatened Highland Grassland species

Sokoke Pipit *Anthus sokokensis*
Endangered Coastal Forest species

Southern Grosbeak Weaver *Crithagra buchanani*
Commiphora and *Acacia* thornscrub

Category C species: EA endemic species shared with both Tanzania and Uganda

Hartlaub's Turaco *Tauraco hartlaubi*
Highland Forest species

Hunter's Cisticola *Cisticola hunteri*
Highland and moorland shrubbery from 1550 to 4400 m

Karamoja Apalis *Apalis karamojae*
Vulnerable acacia savannah species

Black-lored Babbler *Turdoides sharpei*
Acacia savannahs

Kenya Rufous Sparrow *Passer rufocinctus*
Acacia savannahs and cultivation

Category D species: Those species currently extirpated from Kenya or close to being so

Forest Wood-Hoopoe *Phoeniculus castaneiceps*
Formerly in western forests

Speckled Tinkerbird *Pogoniulus scolopaceus*
Formerly in western forests

Bennett's Woodpecker *Campethera bennettii*
Specimen record from Mombasa July 1918

Sooty Boubou *Laniarius leucorhynchus*
Specimen record from Kakamega April 1931

White-winged Apalis *Apalis chariessa*
Formerly in Tana riverine forests

Yellow-streaked Greenbul *Phyllastrephus flavostriatus*
Formerly on Mt Kasigau, Taita District

Kretschmer's Longbill *Macrosphenus kretschmeri*
Formerly in Kitovu Forest near Taveta

Yellow-mantled Weaver *Ploceus tricolor*
Formerly in western forests

Category E species: Those Afrotropical species for which there have been no fully documented records post 31 December 1979

Striped Flufftail *Sarothrura affinis*
High altitude Grassland species

Abyssinian Long-eared Owl *Asio abyssinicus*
Mt Kenya *Hagenia* Forest from 2800 to 3500 m

Little Grey Greenbul *Andropadus gracilis*
Kakamega Forest

Tanzania

Category A species: Endemic species occurring *only* in Tanzania

Udzungwa Forest Partridge *Xenoperdix udzungwensis*
Endangered species (Eastern Arc mountains)

Grey-breasted Spurfowl *Francolinus rufopictus*
Serengeti grasslands

Pemba Green Pigeon *Treron pembaensis*
Vulnerable species confined to Pemba Island

Fischer's Lovebird *Agapornis fischeri*
Near Threatened species (Serengeti–Eyasi basin)

Yellow-collared Lovebird *Agapornis personatus*
Widespread in eastern Baobab savannahs

Pemba Scops Owl *Otus pembaensis*
Vulnerable species confined to Pemba Island

Usambara Eagle Owl *Bubo vosseleri*
Vulnerable Forest species (Usambara Mountains)

Uluguru Bush Shrike *Malaconotus alius*
Critically Endangered Forest species (Uluguru Mountains)

Mrs Moreau's Warbler *Scepomycter winifredae*
Vulnerable species (Ulugurus and Ukagurus)

Rubeho Warbler *Scepomycter rubehoensis*
Vulnerable Forest species (Rubeho Mountains)

Pemba White-eye *Zosterops vaughani*
Confined to Pemba Island

Ashy Starling *Lamprotornis unicolor*
Widespread in *Acacia* woodlands, thornscrub and savannahs

Usambara Thrush *Turdus roehli*
Near Threatened Forest species (Usambara Mountains)

Usambara Akalat *Sheppardia montana*
Endangered Forest species (Usambara Mountains)

Iringa Akalat *Sheppardia lowei*
Vulnerable Forest species (Southern Highlands)

Mt Rubeho Akalat *Sheppardia aurantithorax*
Vulnerable Forest species (Rubeho Mountains)

Banded Green Sunbird *Anthreptes rubritorques*
Vulnerable Forest species (Eastern Arc Mountains)

Moreau's Sunbird *Cinnyris moreaui*
Near Threatened species (Eastern Arc forests)

Loveridge's Sunbird *Cinnyris loveridgei*
Near Threatened Forest species (Uluguru Mountains)

Pemba Sunbird *Cinnyris pembaensis*
Confined to Pemba Island

Rufous-winged Sunbird *Cinnyris rufipennis*
Vulnerable Forest species (Udzungwa Mountains)

Kilombero Weaver *Ploceus burnieri*
Vulnerable species (Kilombero floodplain)

Usambara Weaver *Ploceus nicolli*
Vulnerable Forest species (Eastern Arc Mountains)

Tanzania Thick-billed Seedeater *Serinus melanochrous*
Near threatened species (Mt Rungwe)

Category B and C species: EA endemic species shared with other countries. See under Kenya.

Plus five Near-Endemic species shared with Mozambique and/or Malawi and Zambia.

Dark Forest Batis *Batis crypta*
Near Threatened Forest species

Long-billed Tailorbird *Artisornis moreaui*
Vulnerable Forest species

Dappled Mountain Robin *Modulatrix orostruthus*
Near Threatened Forest species

Spot-throat *Modulatrix stictigula*
Highland Forest species

Tanganyika Masked Weaver *Ploceus reichardi*
Localized Papyrus swamp species

Category D species: Those species currently extirpated from Tanzania or close to being so.

Sooty Flycatcher *Muscicapa infuscata*
Formerly on Ukererewe Island, Lake Victoria

Category E species: Those Afrotropical species for which there have been no documented records post 31 December 1979.

Long-toed Flufftail *Sarothrura lugens*
Type specimen only from Ugalla wetlands (January 1883)

Black-headed Plover *Vanellus tectus*
Vagrant to dry northern savannahs (one record August 1962)

Southern (Vincent's) Rock Bunting *Emberiza capensis vincenti*
Rocky outcrops Songea District

Uganda

Category A species: Endemic species occurring *only* in Uganda

Fox's Weaver *Ploceus spekeoides*
Near Threatened species in swampy savannah

Category B species: Albertine Rift Endemics (those species shared with countries bordering the Albertine Rift Valley)

Handsome Francolin *Francolinus nobilis*
Montane forest undergrowth and bamboo 2100 to 3700 m

Ruwenzori Turaco *Ruwenzorornis johnstoni*
Montane forests from 2100 to 3600 m

Dwarf Honeyguide *Indicator pumilio*
Near Threatened Forest species from 1500 to 2100 m

African Green Broadbill *Pseudocalyyptomena graueri*
Endangered Forest species at 2000 m

Archer's Robin Chat *Cossypha archeri*
Montane forest undergrowth from 1800 to 4000 m

Red-throated Alethe *Alethe poliophrys*
Montane forest undergrowthand bamboo 1500 to 2700 m

Oberlaender's Ground Thrush *Zoothera oberlaenderi*
Near Threatened Lowland Forest species

Grauer's Rush Warbler *Bradypterus graueri*
Vulnerable Forest Swamp species 1500 to 2100 m

Red-faced Woodland Warbler *Phylloscopus laetus*
Montane forestand bamboo from 1500 to 2800 m

Montane Masked Apalis *Apalis personata*
Montane forest from 1800 to 2700 m

Ruwenzori Collared Apalis *Apalis ruwenzori*
Montane forest undergrowth from 1500 to 3000 m

Short-tailed Warbler *Hemitesia neumanni*
Bwindi Forest undergrowth from 1500 to 2100 m

Grauer's Warbler *Graueria vittata*
Bwindi Forest undergrowth from 1600 to 2400 m

Yellow-eyed Black Flycatcher *Melaenornis ardesiaca*
Bwindi Forest clearings from 1550 to 2100 m

Ruwenzori Batis *Batis diops*
Montane forest from 1500 to 2700 m

Stripe-breasted Tit *Parus fasciiventer*
Montane forest from 1800 to 3300 m

Blue-headed Sunbird *Cyanomitra alinae*
Montane forest from 1500 to 3000 m

Regal Sunbird *Cinnyris regia*
Montane forest undergrowth and bamboo from 1500 to 3000 m

Purple-breasted Sunbird *Nectarinia purpureiventris*
Montane forest from 1500 to 2700 m

Stuhlmann's Double-collared Sunbird *Cinnyris stuhlmanni*
Montane forest from 2100 to 3700 m

Strange Weaver *Ploceus alienus*
Montane forest from 1500 to 3000 m

Dusky Crimsonwing *Cryptospiza jacksoni*
Montane forest undergrowth from 1500 to 2700 m

Shelley's Crimsonwing *Cryptospiza shelleyi*
Vulnerable Forest species from 1600 to 3400 m

Category C species: Four EA endemics shared with Kenya and Tanzania (see under Kenya)

Category D species: Those species currently extirpated from Uganda or close to being so

Shelley's Francolin *Francolinus shelleyi*
Formerly on Ankole grasslands

Southern Ground Hornbill *Bucorvus leadbeateri*
Formerly in eastern and southeastern savannahs

Category E species: Those Afrotropical species for which there have been no documented records post 31 December 1979

Orange River Francolin *Francolinus levaillantoides*
Mt Moroto and Kidepo Valley NP

Maccoa Duck *Oxyura maccoa*
Vagrant, no records post 1935

Black-necked Grebe *Podiceps nigricollis*
Vagrant to Queen Elizabeth National Park

Chestnut-flanked Goshawk *Accipiter castanilius*
Bwamba Lowlands

Bates's Nightjar *Caprimulgus batesi*
Bwamba Lowlands

Singing Bush Lark *Mirafra cantillans*
Nomadic grassland species

Pink-breated Lark *Mirafra poecilosterna*
Moroto District

Chestnut-backed Sparrowlark *Eremopterix leucotis*
Moroto District and Mt Napak (Kamalinga)

Turner's Eremomela *Eremomela turneri*
Uganda–DR Congo border areas

Southern Hyliota *Hyliota australis*
Bwamba Lowlands

Wailing Cisticola *Cisticola lais*
Mt Moroto

Sassis's Olive Greenbul *Phyllastrephus lorenzi*
Bwamba Lowlands, though doubt exists regarding the validity of the taxon

Capped Wheatear *Oenanthe pileata*
Vagrant to West Nile and Queen Elizabeth National Park

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Is the Hamerkop *Scopus umbretta* a neo-colonist or an opportunist nester?

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Summary

We report two cases of large aggregations of Hamerkop *Scopus umbretta* nests in relatively small areas; the first had a maximum of 639 nests in 2004, all within an area of about 8 km^2 near to Entebbe, Uganda. However, in recent years there were far fewer nests, with less than a hundred in 2012. The reasons for this decline are unclear. The second site, in Queen Elizabeth National Park, had 56 nests in 2004. There are very few previous records of such gregarious behaviour in this species. Even though a pair may build more than one nest, it implies the presence of a large concentration of birds, which must therefore require rich food sources.

Introduction

The Hamerkop *Scopus umbretta* is generally considered to be a solitary species, although at good feeding places, such as fish-landing sites, it can be gregarious, with occasionally as many as 50 at one place. Similarly, nests are usually found singly, or with two or three together—sometimes in the same tree—since a pair often makes more than one nest (Brown *et al.* 1982, Elliot 1992). Cowles (1930) recorded as many as seven nests built by one pair, but that is exceptional; most pairs build between one and three (Brown *et al.* 1982). Since the massive nests are heavy, probably weighing several hundred kilograms (Kahl 1967), only trees of some strength are suitable.

The behaviour of Hamerkops, and especially their nesting behaviour, has been extensively studied (Brown *et al.* 1982, Elliot 1992) including in Uganda (Kahl 1967). But whilst they all mention the gregarious behaviour of the species, usually at feeding sites, none of these authors described more than one pairs' nests together in one place.

We have been able to find only three reports of aggregations of Hamerkop nests. Wilson & Wilson (1984) in 1978–80 counted 70 nests in an area of about 1.5 km^2, part of a rice scheme in central Mali. Only 14 of these had eggs laid in them. Various other species made use of the empty nests, including a number of Barn Owls *Tyto alba* and Monitor Lizards *Varanus niloticus*. Smaller groups of nests have been reported by Kopij (2005; three active nests close together) and Van Ee (1977; five pairs on one hectare).

Large aggregations of nests in Uganda

In Uganda, A. Byaruhanda (pers. comm.) reported seeing a large number of Hamerkop nests at Garuga, a peninsula jutting into Lake Victoria some 12 km east of Entebbe (00°04′ N, 32°33′ E). Between July and October 2004 SK and RJ made a detailed study of this site. They found 639 nests in 483 trees, scattered through an area they calculated at 8 km^2. Thus in both Uganda and Mali, the loose Hamerkop nest aggregations

had an overall density of about one nest for every two hectares. At a smaller scale, nest density at Garuga varied greatly, with higher concentrations at the edges of the peninsula, and almost no nests towards its centre.

In the meantime, M Behangana (pers. comm.) had also noticed a number of nests adjacent to Kisenyi fishing village (0.53 N, 29.34 E) by Lake Edward, Queen Elizabeth National Park. This site was also visited by SK and RJ in 2004, who recorded 56 nests there.

Garuga is an area of mainly smallholder farms, and most of the nests were close to Lake Victoria. Nesting trees were identified in 2004 as belonging to at least 24 species, with no more than 10 % associated with any single species (maximum 52 nests in *Canarium schweinfurthii*). They were supported by up to seven branches, but most (75 %) by two or three branches Some of the nests were very close together (see photograph), but most were scattered. At Kisenyi 42 of the nests were in *Acacia kirkii* near the mouth of the Nyamweru River. One nest was in an *Albizia* sp. and 13 were in trees of unknown species.

Figure 1. A tree with two nests, on the left, and another nest further to the right, show typical spacing.

In 2007 RK made a detailed follow-up count at Garuga and found only 167 nests. In 2009 RS made another count, recording only 136 nests. Further counts in 2011 (O. Mwebe and N. Gardner, pers. comm.) and 2012 (M. Kibuule, pers. comm.) yielded 99 and 97 nests, respectively. Whilst these more recent surveys were less intensive than that of 2004 it is clear that the number of nests has declined substantially, whilst still remaining remarkable. During the years 2004–12 many of the original trees have been cut down and large numbers of *Pinus* sp. were planted. Nevertheless, there are

still many apparently suitable trees without nests, including some not far from the shoreline. There is therefore no reason to believe that the loss of suitable nesting trees has been a decisive factor in the decline in nest numbers.

In all years, a great variety of nesting materials was noted at both sites. In addition to the main bulk made from plant materials, many nests were decorated with pieces of coloured plastic, old clothes including shoes, and bits of fish netting. Seventy-five per cent of nests were between 4 and 8 m above the ground, but sometimes as low as two metres or as high as 13 m. There were rarely more than three nests in any one tree, although in 2004, there were four trees with four nests each, one with five and one with six.

When there were over 600 nests at Garuga, even if each pair had built seven nests (which seems very unlikely) there would have been over 80 pairs, or 240 birds if an average of one young or juvenile per pair is assumed. Clearly there needed to be sufficient food sources nearby. One candidate for this is the extensive shores of Lake Victoria. A second candidate is a number of fish landing sites, including some on nearby islands. Similarly the Kisenyi colony was close to abundant shorelines and a fishing village. Such sites present many opportunities for foraging and scavenging. If there were other plentiful sources of food for Hamerkops they were not obvious.

Discussion

Campbell & Lack (1985) defined coloniality as, "a spatio-temporal clumping of nests" but pointed out that no objective (or widely-accepted) criteria existed as to how clumped nests had to be to constitute a colony. They suggest that where the clumping is less, the term "loose colony" might be used. On the other hand, "loose colony" suggests a habitual, or at least regular, way of nesting, which in the case of the Hamerkop is still to be proven. We therefore prefer to use the expression "loose aggregation of nests".

Hamerkops are widely-distributed in Africa, and being a monotypic family suggests that they are an ancient line. Several related families, such as storks and herons have many colonially-nesting species, which makes it all the more curious that Hamerkops nesting in aggregations, albeit loose ones, is apparently rare and perhaps even a recent phenomenon.

All bird species require food, water, a place to nest, a place to breed, and safe passage between them. They also need freedom from negative factors that would prevent them from successfully using these sources. Colonial nesting can help protect birds from one of those potential negative factors, namely predators. However, colonial nesting can only be successful if there are sufficient food resources close enough to the colony.

In the case of the Hamerkop, a species that is apparently not very particular about which tree species it constructs its large nest, the availability of nesting places does not appear to be a factor that determines density of nesting. Even in the denser parts of the nesting aggregation at Garuga many apparently suitable trees carried no nests (see Fig. 1).

On the other hand, the species has become a common scavenger at fishing villages on the shores of the lakes of Uganda, and along main roads (especially after rain). It is also quite common in suburban Kampala, where it uses the roofs of buildings for territorial announcements.

Our hypothesis is that the Hamerkop is not strongly territorial, at least where food is plentiful. And that the presence of plentiful food and plentiful nesting places can lead to it breeding in loose aggregations rather than singly. It will be interesting to see this hypothesis tested more fully, and to follow further developments in Hamerkop nesting density in Uganda and elsewhere in Africa. Research into the cause or causes of the decline in occupied nests at Garuga would also be useful.

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Short communications

Comments concerning the races of the Crested Guineafowl *Guttera pucherani* in Tanzania, in particular the position of *Guttera pucherani granti* (Elliot)

The Crested Guineafowl *Guttera pucherani* is widely distributed in Tanzania, and is represented there by several distinctive forms. However, the taxonomy of the crested guineafowls in Africa is complex and in need of review.

Peters (1934) listed two races of *Guttera plumifera*, eight races of *Guttera edouardi* and the monotypic *Guttera pucherani* in his World Checklist. White (1965) followed suit, but replaced *pallasi* with *verreauxi*, and added *granti* to make a total of nine races within *edouardi*. Later, Britton (1980) followed White by admitting both *edouardi* and *pucherani*, with *barbata, granti, sethsmithi* and *schoutedeni* as races of *G. edouardi*.

Crowe (1978), and in Urban *et al.* (1986), regarded *pucherani* and *edouardi* as conspecific, based on intergradation in captivity and in the wild and placed four races (*edouardi, verreauxi, sclateri* and *barbata*) within *pucherani*, and considered five (*sethsmithi, schoutedeni, pallasi, chapini* and *kathleenae*) as synonyms of *verreauxi*, but failed to mention *granti*. Later, McGowan (1992) followed Crowe (*op. cit.*) by also omitting any reference to *granti*, stating that only nominate *pucherani* showed any red orbital skin.

Within Tanzania several forms are present, but much confusion has arisen over which ones. Crowe (1979) clearly erred in showing a huge area of central Tanzania as lacking any Crested Guineafowls, when in fact that area almost paralleled the range of *granti*. Similarly, the omission of *granti* by Crowe in Urban *et al.* (1986), together with mention of a collar of black feathers on the lower neck and upper breast (yet not shown in the accompanying plate) in nominate *pucherani*, has led to further confusion, particularly so when a photograph of nominate *pucherani* in McGowan (1992) clearly showed no black collar on the lower neck and upper breast.

Basic identification of the races of the Crested Guineafowl is based on the following criteria: colour of the throat and neck, and the presence or not of a broad band of black feathers at the base of the neck. Eye colour is also important, red or dark brown. The races likely to occur in Tanzania are:

Guttera p. pucherani (Hartlaub). Zanzibar, the coastal lowlands south to the Rufiji River, and inland to Kilimanjaro and the Uluguru Mountains. Sides of face and neck greyish blue, throat and orbital skin bright red. *No* black collar on lower neck. Eyes red.

Guttera p. granti (Elliot). Ranging over a wide area of inland Tanzania from Oldeani and Manyara south through Kondoa and Dodoma districts to Mikumi and Ruaha National Parks and the Udzungwa Mountains. Sides of face and neck bluish-grey, throat and orbital skin bright red. Broad black collar on lower neck. Eyes red.

Guttera p. verreauxi (Elliot). Western and northwestern Tanzania. Sides of face and

neck bluish grey; small area of pinkish-red on throat. Broad black collar on lower neck and upper breast. Eyes dark brown.

Guttera p. barbata Ghigi. Occurring in extreme southern border areas and in southeastern coastal lowlands north to the Rufiji River. Sides of face, neck and throat bluish black, little or no trace of red on throat. Broad black collar on lower neck. Eyes red. Possibly hybridizes with nominate *pucherani* in northern parts of its range.

Details of all known localities for the Crested Guineafowl in Tanzania can be found at www.tanzaniabirdatlas.com.

Figure 1.

The race *granti* (Elliot), for which there is no type specimen, was based on a sketch (Fig. 1), currently housed in the Scottish National Library Archives, Edinburgh, of a bird shot and eaten by Major James Grant at Ugogo, Dodoma District on 8 December 1860. Later, Sclater (1931) commented that 'the special character distinguishing this race is the red on the face and throat that distinguishes it at once from the South African *Guttera e. edouardi*, in which the face and throat are dark'. It would seem that Crowe (*op. cit.*) had merely considered *granti* as synonymous with nominate birds on account of the similar facial pattern, but was clearly confused concerning the issue of a broad black collar on the lower neck of *granti*, yet absent in nominate birds. The error in the text in Urban *et al.* 1986 relating to the presence of a black collar in nominate birds can only be regretted. Fig. 2 is a photograph of *granti* taken in Mikumi National Park.

Guttera p. edouardi (Hartlaub) is extralimital, occurring from southern Zambia, Malawi and Mozambique south to Natal. The sides of the face and throat are dark slate grey, with a curly black crest, a broad black collar on the lower neck, and a prominent whitish fold of skin on the hindneck. Eyes crimson. Possibly hybridizes with *barbata* in some northern areas.

In conclusion, we recommend that *granti* be re-admitted as the race occurring throughout inland Tanzania from Oldeani and Manyara south to Mikumi, Ruaha and the Udzungwas.

Figure 2.

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Recent unprecedented numbers of Red-necked Phalaropes *Phalaropus lobatus* in Tanzania, and some older undocumented records

In Kenya, Red-necked Phalaropes *Phalarops lobatus* have frequently been recorded in offshore waters between October and April, sometimes with scores or even hundreds together. Occasional inland records have been mainly of small numbers on the Rift Valley lakes, but with up to 30 together at Ferguson's Gulf, Lake Turkana, and up to 15 at Lake Nakuru (Hopson & Hopson 1975, Britton 1980, East African Bird Reports for 1979–1992, Pearson & Turner 1998).

For Tanzania, however, Britton (1980) gives only two records: a single bird near Tabora on 10 October 1962 and a few at Lake Masek in January and February 1975.

Subsequently, four additional records were added to the Tanzanian Atlas data base up to 2011, all of single birds: Arusha NP, April 1981 (John Beesley); Kunduchi Salt Pans, Dar-es-Salaam, January–February 1984 (Neil and Liz Baker); Saadani Salt Pans, January 2005 (Jan Olsen); and Bagamoyo Salt Pans, January 2005 (Thomas Jacobsen.) Then, early in 2012, unprecedented numbers were recorded at two coastal sites.

On 30 January Mark and Alison Muller counted 25 birds on salt pans north of the Wami River on the edge of Saadani NP. Then on 5 February at least 28 birds were found on the salt pans north of Bagamoyo, the site that held the single bird in January 2005. The first six birds were found feeding, not by moving in tight circles but simply swimming and rapidly inserting their bills just below the surface of the flooded pans. Minutes later successive groups of three, two and four birds were noted resting along the banks of adjacent pans. Within 30 minutes a larger flock of 13 birds was found, two feeding in a similar manner to the first group, the others resting on exposed substrate. A small flock of Marsh Sandpipers *Tringa stagnatalis* and a single Ruff *Philomachus pugnax* were observed feeding in the same manner as the phalaropes among a larger flock of Black-winged Stilts *Himantopus himantopus*. The stilts were also catching prey just below the surface but were tall enough to wade in the shallow water. All 28 phalaropes were still present on 11 March.

These phalaropes were presumably from the wintering population known to occur well offshore in the northwest Indian Ocean (Cramp 1983). Their unprecedented numbers suggest either weather or food related movements of this population away from their traditional wintering grounds.

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The first four records of Slender-billed Gull *Larus genei* for Tanzania

Four recent Tanzanian records of Slender-billed Gull *Larus genei* have all been accepted by the East African Rarities Committee.

On 28 February 2010 at Speke Bay Lodge on the southeastern shore of Lake Victoria NEB located a flock of seven birds. They were on the water some 100 m offshore with a small flock of Grey-headed Gulls *L. cirrocephalus* and a lone Black-headed Gull *L. ridibundus*. Also present were a number of Gull-billed *Gelochelidon nilotica*, Whiskered *Chlidonias hybridus* and White-winged Black Terns *C. leucopterus*. The light conditions were far from perfect but the long necks of the Slender-billed Gulls, their whiteness

and their distinctive head shape stood out. As the viewing improved three birds were seen to have red bills, the small "beady" eye was noted (but looked dark from a distance when not viewed side on) and pale red legs were glimpsed. Liz Baker, Matt Aeberhard, Maneno Mbilinyi and Leons Mlawila all subsequently saw the birds well and agreed with the identification.

On 20 September 2010 near Maramboi Tented Camp on the eastern shore of Lake Manyara Steve Windels observed three gulls that he described to JCC as Slender-billed and which he photographed. On 25 September JCC was with SW when the three gulls were seen and photographed again. All appeared to be adults in winter plumage. The most obvious features were the apparently "long" head with shallow sloped forehead and very faint ear spot, and the long, slender bill, pale orange with no dark markings. The mantle and innerwing were pale grey, the underparts clean white with a slight pink cast. In the photos the eyes appeared pale, the legs similar in colour to the bill. Size and wing pattern were considered similar to those of Black-headed Gull *L. ridibundus*.

On 30 September 2010 MA located and photographed two adult Slender-billed Gulls in the southeast lagoon at Lake Natron, at the mouth of the main spring that runs from below Makat House. Both showed a distinctive pink flush below and pure white heads. The grey backs were pale compared to those of Grey-headed Gulls present. The bills of both birds were dark and long—if not particularly "slender", the foreheads long and sloping. Distinctively attenuated necks were noted in flight. In size they were similar to Grey-headed Gulls (Black-headed Gull would appear smaller than this species). These birds remained at the site until at least 10 October.

On 20 February 2012 AK found and photographed another adult Slender-billed Gull on the north-eastern shoreline of Lake Eyasi, some 50 km due west of Lake Manyara.

There is an earlier published Tanzanian record from Lake Manyara on the 28 March 1971 (Watson 1971), but following Oreel (1975) this was not accepted by Britton (1980), essentially because the report mentioned dark eyes and did not explicitly exclude Black-headed Gull. The above therefore constitute the first substantiated records for the country. Involving at least 14 individuals from four different localities they suggest a southerly extension of the wintering range of this gull.

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The revision of Britton (1980) and the need to keep pace with all on-going ornithological research and publications

Thirty years ago Britton's *Birds of East Africa: their habitat, status and distribution* was a landmark publication covering all known bird species occurring in Kenya, Tanzania and Uganda. It was at the time the definitive work of its type for a region of outstanding biodiversity. It was the work of ten authors, all of whom had particular interests and areas of experience and expertise.

Since then our knowledge of East African birds has increased considerably and, together with the advances in DNA sequencing, our understanding of avian systematics and taxonomy is continually moving forward. As a result, there are now hundreds of recommended changes from that first review of East African birds back in 1980. In addition, there have been several major field guides, bird atlases and checklists published in the last twenty years, all designed to assist in the identification of the birds of our region. While the forthcoming revision of Britton cannot list in minute detail the distribution of any species over such a vast area, readers are urged to consult the on-going atlas projects for each of the three countries for more detailed overviews of individual species distribution.

As our knowledge of bird species and families increases, there is need to be more aware of the importance of avian taxonomy, systematics and nomenclature. All bird species are known by the name given to it by the person who first described it. Vernacular names will vary the world over and while there is no hope of any consensus within the English-speaking world in this respect, all our common vernacular names are merely for regional use only. However, it is always best to follow a recognized and authoritative publication when deciding on any vernacular name. In my revision, all scientific names will follow those used in the forthcoming revision of Dickinson (2003), while English names will follow those used in our local field guides and checklists. The revision will also contain full details of all type specimens collected in East Africa from 1824 to the present time.

The most influential work on avian systematics to date was, without doubt, that undertaken by Charles Sibley and his collaborators using DNA–DNA hybridization applied to a wide range of avian taxa. Despite much criticism, some of the higher level relationships revealed have stood the test of time, and have been substantiated by later methods. However, others have not, and therefore caution is urged to all who may prefer to blindly follow the classification proposed in Sibley & Ahlquist (1990), and Sibley & Monroe (1990, 1993). Their resulting classification advocated many changes to the more conventional familiar groupings, but to date only a very few authors have incorporated the more radical aspects of that Sibley & Monroe assemblage.

All taxonomic debates centre around the definition of species and subspecies. The two major species concepts today are the Biological Species Concept (BSC) and the Phylogenetic Species Concept (PSC). The traditional Biological Species Concept as advocated by Mayr (1963, 1970) and long used in East Africa (Britton 1980, Zimmerman *et al.* 1996) treats species as groups of interbreeding populations that are reproductively isolated from other groups. Initially it was felt that hybridization by two taxa when in contact with each other indicated that they represented a single species. This was later modified to allow for the acceptance of stable hybrid

populations when interbreeding regularly occurred between two accepted species (Short 1969, Mayr 1982).

However, I must again urge caution in the blind acceptance of all that is published today. While the Phylogenetic Species Concept cannot totally replace the Biological Species Concept, we must all remind ourselves that species cannot be defined simply on phylogenetic evidence alone, and while it is good to publish these results, there is the need for a caveat that, while such results may suggest a relationship, they do not necessarily prove one. Vocalizations are also an important tool in helping to determine whether certain species are closely related or not and, as such, should always be taken into consideration when determining a relationship between differing forms.

The taxonomic level at which an avian population is recognized often has a significant impact on the conservation status that is given to it and, as a consequence, the resources that flow on from this. A current topic of debate is whether some forms should be treated as species in order to assist with conservation efforts, even when other evidence does not support such a status. An example is the several endemic subspecies within the Eastern Arc Mountains of eastern Tanzania and south-eastern Kenya that have been proposed as species in order to attract greater conservation attention and protection.

To date, all East African lists have been based on the published works of Britton (1980), Zimmerman *et al.* (1996), and the six-volume *Birds of Africa* (1982–2004), with modifications following Dickinson (2003) and periodic BOU Taxonomic Recommendations published in *Ibis*. The forthcoming Systematic and Taxonomic Revision of East African birds will look closely at all published material and subsequent taxonomic recommendations, but will rely largely on peer-reviewed publications. It will also draw heavily on the recommendations contained in the forthcoming 4th edition of the *Howard & Moore Complete Checklist of Birds of the World* (Dickinson & Remsen *in prep*). In cases where taxonomic decisions are either pending or unresolved, then a conservative approach will be made until further evidence is forthcoming.

It must always be remembered that there is no single correct list of birds for any country or region of the world, as levels of understanding vary between authors and regional authorities. Therefore any list should be treated as a provisional classification that hopefully will be revised at regular intervals as new studies and data become available. However, with the speed of published taxonomic recommendations reaching unprecedented levels, a word of caution must also be urged when considering some seemingly authoritative recommendations. Many molecular studies are often limited in scope, while others are often poorly researched, resulting in some highly questionable results.

East Africa continues to be one of the major areas of biodiversity in Africa, and particularly in Tanzania many new discoveries continue. Sadly, in Kenya we are witnessing a devastating decline in some of our most precious of natural resources, due largely to a growth in human population that is already showing signs of becoming unsustainable. As a result we have already lost a number of bird species, and others, particularly forest and grassland species are declining rapidly. All species that are in decline will be highlighted in my revision with current Global and Regional Threat levels indicated.

While all species accounts are currently in a second draft stage, all are open for review and revision and additional data are always welcomed from interested people.

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Swallow-tailed Bee-eater *Merops hirundineus:* first record for Kenya

On 21 May 2000, while birding around the extensive pools of the Sand Quarry in Arabuko-Sokoke Forest near the Gede forest station mid-morning with Tansy Bliss, she suddenly noticed a small bird sail out from the top of a tree and return to it with an insect. As it perched on an exposed branch we found ourselves looking at the back of a largely green bee-eater with a striking long blue and very deeply forked tail with extensive white tips. It was a species I was not familiar with so we therefore took detailed field notes of it. We watched it for about four minutes including seeing it fly from the first perch to another one lower down and set against the darker background of dense foliage. It still had its back turned to us but it moved enough to briefly show a narrow, darkish breast band below a bright yellow throat and the broad, black eye-stripe looking like a mask. It was quite vocal, giving a typical bee-eater high-pitched trilling call though not particularly loudly. It stayed long enough for us to watch it for a total of 3 to 4 minutes after which it took off and flew up and away over the trees to the east, still calling. In spite of trying to follow it, the bird was not seen or heard again.

When we reached home and consulted the literature, it was very easily identified by the long blue, forked tail as a Swallow-tailed Bee-eater *Merops hirundineus.* I immediately informed John Fanshawe before heading back up to the swamp armed with camera and 500 mm lens. I spent a further two hours around the same area and

towards where the bird had been seen to fly but was unable to relocate it. JF also visited the area and watched for an hour but also without luck. The bird was not reported again by any other visitor during the following week and must have simply moved on.

Discussion

Identification of this species is thankfully not very difficult, the Swallow-tailed Bee-eater being the only bee-eater in the world with the long, blue, deeply-forked tail. Indeed, this field character serves "…to distinguish this species from all other bee-eaters and indeed from all other birds" (Fry *et al.* 1992).

M. hirundineus is recognized as comprising of four sub-species. *M. h. chrysolaimus* in West Africa and *M. h. heuglini* in Sudan, Ethiopia, DR Congo and Uganda both have green tails—the Arabuko-Sokoke bird had a clearly had a blue tail and thus could not have been either of these. The bird was not seen well enough to note the detail of further racial features on the forehead and throat but from a distribution of the races one is far more likely than the others. *M. h. hirundineus* is found in central and western southern Africa and so is much less likely than *M. h. furcatus* which occurs further east and north into the southern half of Tanzania up to around 5° S with only 2–3 records just north of this.

The species is known to be somewhat migratory though its movements are as yet poorly understood. This bird was an adult, immatures lacking the yellow throat, and is likely to have moved up the coastline from south of Dar es Salaam ending up in some favourable habitat in Arabuko-Sokoke.

The species is said to have been recorded in Vanga on the southern Kenya coast (Lewis & Pomeroy 1989); however, the record(s) was unverified and the species removed from the Kenya list. This being the case, the bird seen in Arabuko-Sokoke and described here is the first record for Kenya.

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Remarks concerning the East African coastal form of the Tropical Boubou *Laniarius aethiopicus sublacteus* (Cassin 1851), and its supposed black morph

The Tropical Boubou *Laniarius aethiopicus* is a common and widespread black-and-white bushshrike of forests, woodlands and thickets throughout much of East Africa. The coastal form *sublacteus*, treated recently as a race of this species, was described by John Cassin in 1851 as *Dryoscopus sublacteus*. The type was part of the Massena (Rivoli) Collection of African birds acquired for the Academy of Natural Sciences of Philadelphia in 1846. Cassin gave "Eastern Africa" as the type locality, though

it possibly originated from Zanzibar. Grant & Mackworth-Praed (1944), when discussing the races of *Laniarius ferrugineus* in eastern Africa, proposed Mombasa as the type locality of *sublacteus,* with a distribution from Mombasa to Dar es Salaam and west to Makindu, Lake Jipe, the North Pare Mountains and Mpapwa. They later (Grant & Mackworth-Praed 1947) restricted the type locality to Lamu, eastern Kenya, but without giving their reasons.

In July 1878 an all-black bushshrike was collected from Kipini, Lamu district, eastern Kenya, and named *Dryoscopus nigerrimus* by Reichenow (1879). Later, Reichenow (1905: 834), when describing material collected by Erlanger from the Juba Valley, southern Somalia, named another all-black bird as *L. erlangeri* and a black-and-white one as *L. a. somaliensis.* Between 1916 and 1918, van Someren and his collectors obtained series of bushshrikes from Lamu District and from the Lower Juba Valley, which included both black-and-white and all-black birds. Van Someren compared his own all-dark birds from Manda Island with those he had himself collected from the Lower Juba. He could detect no differences and so seriously questioned the validity of the name *erlangeri,* considering it to be a synonym of *nigerrimus* (van Someren 1922, 1932). Jackson & Sclater (1938: 1209) fully supported van Someren's comments on these all-black boubous, and listed *L. nigerrimus* for the Kenya Colony and Italian Somaliland. Subsequently, however, Stresemann (1947) deemed that Reichenow's Kipini bird was no more than a mutation of *L. ferrugineus sublacteus,* while Mackworth-Praed & Grant (1955: 643) considered it to be a melanistic phase of *L. a. sublacteus.* The myth of a rare dark morph of *sublacteus* in Kenya's coastal forests was then perpetuated in the literature for over sixty years (Zimmerman *et al.* 1996, Fry *et al.* 2000, Harris & Franklin 2000).

Recently, we demonstrated quite clearly that the all-black birds on Manda Island, Lamu District, are vocally and behaviourally quite distinct from black-and-white *sublacteus* (Turner *et al.* 2011). Nguembock *et al.* (2008) in their phylogeny of some *Laniarius* bushshrikes, showed that an all-black bird from Somalia, which they considered to be *erlangeri,* was not closely related to *Laniarius aethiopicus,* and suggested that it warranted species status. Whether *nigerrimus* and *erlangeri* are the same species (or the same taxon as claimed by van Someren) can be better determined when their DNA is compared. The status of *somaliensis* with respect to *sublacteus* likewise requires a DNA comparison. Although Nguembock *et al.* (*op. cit.*) recommended separating both *sublacteus* and *major* from the traditional *L. aethiopicus,* further study of vocalizations together with additional molecular work that includes representatives of *erlangeri, nigerrimus* and *somaliensis* would seem necessary to clarify relationships and species limits within this group of bushshrikes.

In the meantime we propose that the all-black coastal boubous in eastern Kenya at Kipini and Manda Island be separated from *sublacteus* and treated again as *Laniarius nigerrimus* (Reichenow 1879).

Acknowledgements

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Remarks concerning two sympatric seedeaters *Poliospiza* spp. in northwestern Kenya

Two seedeaters (included in *Crithagra* in the 2009 *Kenya checklist* (Bird Committee 2009)), *Poliospiza* (*gularis*) *elgonensis* known as the Streaky-headed Seedeater, and *Poliospiza* (*reichardi*) *striatipectus* known as the Streaky-breasted Seedeater are rare or scarce wanderers (or residents) in areas between 1600 and 2000 m around the Tambach and Kongelai escarpments in northwestern Kenya.

Taxonomically these two forms (*elgonensis* and *striatipectus*) have generally been treated as the northernmost races of two species largely centred in southern Africa, and it was only fairly recently that Zimmerman *et al.* (1996) had questioned this position, but they felt that, although there appears to be considerable variation in the ventral streaking, all Kenyan birds seem assignable to either *striatipectus* or *elgonensis*, and

so, following White (1963), they preferred to maintain the two species. Nevertheless, at one time, Sclater (1930) had believed that the plain-breasted *elgonensis* was merely the adult plumage of the streaky-breasted *striatipectus*, and some southern African authorities also considered *reichardi* a race of *gularis* (Skead 1960, Mackworth-Praed & Grant 1963). Currently, however, there is little evidence to support such a theory, and it is now generally accepted that two separate species are involved, at least in southern Africa.

Turning to the East African populations, *P.* (*gularis*) *elgonensis* ranges from South Sudan and northeastern DR Congo across northern Uganda to the Mt Elgon district of northwestern Kenya. While seasonally common in Garamba NP, it is decidedly scarce and little known in the dry wooded savanna of northern Uganda, and in Kenya it is known only from the type collected on the southern slopes of Mt Elgon in June 1900, together with less than ten subsequent sight records all within 50 km of the type locality. Despite extensive playback of taped songs of the southern African *gularis*, there have been no vocal responses whatsoever from either *elgonensis* or *striatipectus*, and indeed vocalizations of *elgonensis* remain unrecorded.

P. (*reichardi*) *striatipectus* ranges in open wooded savanna in southern Sudan, the western Ethiopian highlands and on shrubby escarpments in northwestern Kenya from Mt Elgon east across Elgeyu (the type locality) and the Laikipia Plateau to the northern slopes of Mt Kenya. In addition, the generally shy and inconspicuous northern *striatipectus* bears little or no similarity to the southern African nominate *reichardi*, itself largely endemic to the miombo woodlands of Zambia and southern Tanzania.

The true taxonomic picture is further obscured by the considerable variation in the calls of *gularis* across its range in both the northern and southern tropics, while the vocalizations of *striatipectus* in northwestern Kenya are a mixture of trills interspersed with some very unmusical twittering coupled with much repetition and extensive imitations of other bird species. Critical comparison of the calls of nominate *reichardi* with those of *striatipectus* is clearly required.

That two similar seedeaters appear to co-exist alongside each other in bushed and wooded savanna of north-western Kenya and southern Sudan is remarkable. The absence of *striatipectus* from Uganda may be real, but at the same time some sight records of *elgonensis* there may possibly refer to *striatipectus*.

Furthermore, if one considers the possibility that *elgonensis* may be linked to the West African *Crithagra canicapilla*, and that *striatipectus* may be better treated separately from *reichardi*, it might not be unreasonable to consider East African birds as the Northern Streaky-headed Seedeater *Crithagra canicapilla elgonensis* and the Northern Streaky-breasted Seedeater *Crithagra striatipecta*.

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Verreaux's Eagle Owl *Bubo lacteus* attacked by Thick-billed Ravens *Corvus crassirostris*

While living in Bedele, Illubabor, Ethiopia a few years back (16 September 1989) we came across an incident worth reporting after more than 20 years.

At about 14:00 our attention was drawn to a group of four Thick-billed Ravens *Corvus crassirostris*, normally a noisy species, but the present ones appeared to be unusually agitated in a nearby acacia tree.

As we approached, a Harrier Hawk *Polyboroides radiatus* flew off with two ravens in close pursuit and all disappeared from sight, but the ravens returned after about two minutes. Almost immediately afterwards, what appeared to be a Wahlberg's Eagle *Aquila wahlbergi* also flew away with another two ravens in pursuit. It landed in a nearby dead tree, and was thereafter ignored by the ravens.

Although two possible candidates for the consternation had gone, the agitated calling continued unabated and was increased through the arrival of a pair of vociferous Cape Rooks *Corvus capensis*. It was now obvious that there was some other cause for the mobbing behaviour of the ravens. On closer approach we found a fully grown Verreaux's Eagle Owl *Bubo lacteus* perched high in the tree being closely attacked by the ravens. The Cape Rooks provided a rather more distant but very noisy support. The owl was well placed within a tangle of thorny twigs among which it was protected from the ravens' beaks which were only able to attempt to reach it one at a time through one opening among the branches. At this point one of the ravens (frustrated in its attempt to reach the owl?) began to deliberately break off the twigs with its beak in order to increase the size of the hole.

After a few minutes, all four ravens adapted this activity, and soon made an opening large enough for them all to get through and attack the owl from several directions. Despite their numbers, large size and powerful bills, the ravens were very wary of the owl, never facing it and always striking at it by jumping up and pecking at its rear. After a few minutes of being forced to fight against four attackers simultaneously the owl took off pursued by the ravens. It alighted again in a nearby tree, but was almost immediately forced to fly again into another where it remained until dark, continually mobbed by the ravens. The owl was not there the following morning and we did not see it again.

Of particular interest to us was the persistence and ferocity of the attacking ravens, and the fact that two other species of potential predators were also present, and apparently had been attracted to the scene. The late Leslie Brown in his book African Birds of Prey (1970) has reported Verreaux's Eagle Owls preying on the young of Pied

Crows and buzzards, so that probably all the corvids and raptors involved in this incident were reacting to the owl as a potential predator of their young.

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Observations on two nests of the Black-headed Siskin *Serinus nigriceps* in the Bale Mountains National Park, Ethiopia

The Bale Mountains in southeast Ethiopia support an exceptionally varied avifauna, including six Ethiopian endemic species and a further 16 near endemic species (shared with Eritrea) (Williams *et al.* 2004, Asefa 2007). But this avifauna remains rather poorly studied, with little information on breeding biology in particular. One of these endemics, the Black-headed Siskin *Serinus caniceps* is found in the western and southeastern highlands of Ethiopia, in Afro-alpine moorlands, highland grasslands and open areas of montane forest (Urban & Brown 1971, Urban 1980, Vivero Pol 2002, Ash & Atkins 2009). During September–October 2007, we observed breeding of this species in Bale Mountains National Park. Two nests were found in the northern woodlands at 7°05′ N, 39°47′ E; 3150 m, in an area dominated by *Juniperus procera, Hagenia abyssinica and H. revolutum* woodland, shrubs such as *Euphorbia dumalis, Solanum marginatum* and *Acanthus sennii*, grasses including *Agrostis* spp., *Andropogon* spp., *Poa* spp. and *Festuca* spp., and herbs *Satureja paradoxa, S. simensis* and various *Trifolium* spp. This area experiences light rains from March to June and heavy rains from July to October with a dry season from November to February (Hillman 1986, Asefa 2005).

Observations were made between 12 September and 20 October. A first nest (nest A) was discovered by AA on 11 September. Construction was almost complete and eggs not yet laid. AA then found another nest (nest B) with three chicks on 14 October. We watched both nests using 8 x 40 binoculars, usually standing concealed among shrubs about 7 m away. We observed nest building activity (nest A) for 2 h each day for three days, noting frequency of visits, type of materials delivered, and any nest building or courtship behaviour of the male and female. We made further observations twice each day, from 08:30 to 09:00 and from 15:30 to 16:00, from the first egg-laying date to hatching date . We measured nest height and dimensions, and major (C1) and minor (C2) egg circumferences. We checked both nests each morning until all chicks had left and also noted nest site selection and egg morphology. The major (D1) and minor (D2) egg diameters were calculated from C1 and C2, using the formula, $D_i = C_i/2\pi$.

Nest site selection and nest building behaviour

Both nests were built in *H. revolutum* shrubs, 1.85 m and 1.65 m tall respectively.

Nest A was positioned on a branch 1.45 m above ground, nest B 1.35 m above ground (Fig. 1). Nests were compact, cup-shaped structures, A with a depth of 40 mm and cup diameter 55 mm, B with a depth of 39 mm and cup diameter 56 mm. The rims of both consisted of grass stems (*Agrostis* spp., *Andropogon* spp., and *Poa* spp.) and rootlets, and the insides were lined with feathers, fibres and spider webs (Fig. 2).

We observed only the female delivering nesting materials and building the nest. The mean frequency of delivery of materials was 2 ± SD 1.1 per hr. The male often accompanied the female, but was not observed to participate in gathering or building. On one such occasion the male displayed courtship behaviour, uttering and flapping his wings around the female while she collected materials. The female (nest A) ceased building activity once she laid the first egg, after which the male appeared to abandon the nest site.

Figure 1. Position of the nest (A) in the *Hypericum* shrub and the incubating female brooding the eggs.

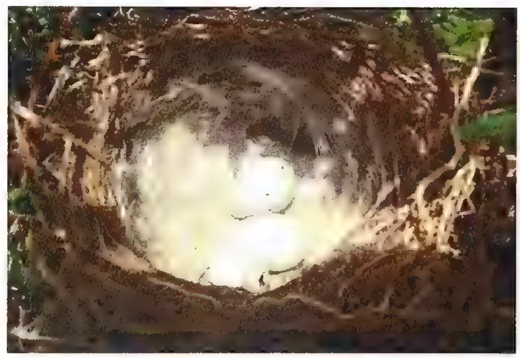

Figure 2. Nest A of Black-headed Siskin *S. nigriceps* containing three eggs.

Egg morphology, incubation and nesting period

The female of nest A laid three eggs on consecutive days, 17–19 September. These were oval and bluish-white with a few brown spots (Fig. 2). Mean egg size (diameter x width) was 17.67 ± SD 0.58 mm x 12.58 ± SD 0.58 mm.

The incubation period from laying of the first egg until all eggs were hatched was 14 days. Two weeks after chicks hatched, one of the fledglings along with the female disappeared, but the male reappeared and began to care for the remaining chicks until they fledged, which was three days following the female's disappearance. We assumed that the first chick was not lost since we found no evidence of predation around the nest site. The total nesting period from laying of the first egg until all young had left the nest was 28–31 days. Extrapolating observations from nest A, we therefore estimated that the first egg-laying date for nest B was probably between 16 and 19 September. We did not observe the male at nest B at any time.

Discussion

Our findings concerning breeding seasonality and general nest structure accord with those given earlier (Ash 1979, Urban 1980, Hillman 1986). Ash (1979) also noted Black-headed Siskins as breeding in the rainy season, mainly in September. But here we present a more detailed picture of nest materials, eggs, incubation and fledging. Feathers, spiders' webs and plant fibres were noted in the nest structure, in addition

to the rootlets, stems and grasses reported previously (Ash 1979, Vivero Pol 2002). In the northwestern highlands, Ash (1979) found that Black-headed Siskins preferred to nest lower (≤ 1 m high) than other *Serinus* such as Streaky Seedeater *S. striolatus* and Brown-rumped Seedeater *S. tristriatus,* and suggested this was due to their stronger flight and thus better ability to avoid predators. Our nests were both >1 m high, similarly positioned to those of other *Serinus* species. Branches at greater height tend to produce a denser structure, which may give better nest support, provide more concealment, and serve as shelter against heavy rain and strong winds during the wet season. But given the similarities in vegetation types, climate and topography between the two areas (northwestern and southeastern highlands) there seems no obvious reason for this nest height difference, though it may reflect a difference in potential predators or in conspecific competition for sites.

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Pectoral Sandpiper *Calidris melanotos*: first record for Tanzania

At 14:40 on 14 March 2005, whilst watching waders at Ngorongoro Crater Lake, my attention was drawn to a bird feeding on mud between tussocks of reed *Juncus* sp. by the lake edge. It was distinctly warmer toned, more buffy, than the bleached winter plumage Little Stints *Calidris minuta* and Curlew Sandpipers *C. ferruginea* present. The brown upperparts showed buff scaling, the white belly with a few streaks at the side

was sharply demarcated from the well streaked throat, and the rump and tail were dark. The legs appeared fairly short, green-yellow, their colour not affected by the grey-brown salt mud. The bill was relatively long and showed a drooping tip. The impression was of a bird that preferred to keep to itself, probing close to the reeds and hustling other birds, including Marsh Sandpipers *Tringa stagnatilis* and Ruffs *Philomachus pugnax*, away from its immediate vicinity. During these interactions it was noted to be slightly smaller than a Curlew Sandpiper, certainly not as tall, but distinctly larger than a Little Stint. It was identified as a Pectoral Sandpiper *Calidris melanotos*.

The bird was found again on the afternoon of 15 March and additional features were noted. A pale base to the bill was comparable with the green-yellow colour of the legs, but slightly duller. The centres of the scapulars were darker than the upperwing coverts. When the bird spread its wing it showed only a trace of a wing-bar. The primary feathers were reasonably fresh, suggesting that this was not a first-winter bird. Long-toed Stint *C. subminuta*, another pale-legged species, was ruled out by size, relative length of bill and legs, and general jizz (the bird never appeared attenuated). Sharp-tailed Sandpiper *C. acuminata* was eliminated by the sharply demarcated streaked breast. The bird was not visible when the site was revisited on 17 March, but was found once more in the same area of *Juncus* on 21 March.

Photographs taken on 14 March from about 6 m distance were submitted to the Tanzanian bird atlas project. This record has been accepted as a first for Tanzania by the East African Rarities Committee.

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News items

New secretary for the East African Rarities Committee

The East African Rarities Committee (EARC) has a new secretary, Kenya resident Nigel Hunter. The committee covers Kenya, Tanzania and Uganda and collects details of up to and including the fifth record of all rare species for each country. The EARC prefers to receive records in electronic form via Email sent to nigelhunter@ timbale.org. Photographs of rarities seen are especially useful, but if photos are not available then a full written description is required. Past records of such rare species are also sought. For those who do not have access to the internet, records can also be submitted by post to Nigel Hunter, P.O. Box 24803, Karen 00502, Nairobi, Kenya.

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Dates: 21 February 2001 [note the order, no comma, not 21st].

Time of day: 13:00 [note colon, no 'hours', 'hrs' or 'h'].

Names of birds: e.g., White-necked Raven *Corvus albicollis* [no comma, no parentheses, no author's name].

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(*continued on inside back cover*)

Give names of journals in full. For books, after author(s), year of publication and title, give town followed by the publisher. For example:

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Stuart, S.N., Jensen, F.P., Brøgger-Jensen, S. & Miller, R.I. 1993. The zoogeography of the montane forest avifauna of eastern Tanzania. Pp. 203–228 *in* Lovett, J.C. & Wasser, S.K. (eds) *Biogeography and ecology of the rainforests of eastern Africa.* Cambridge: Cambridge University Press.

Urban, E.K., Fry, C.H. & Keith, S. (eds) 1986. *The birds of Africa.* Vol. 2. London: Academic Press.

Both English and scientific names of birds should be given when the species is first mentioned—in the title and in the text—thereafter, only one name should be used.

Bird names, both English and scientific, should be those of a stated work. Any deviations from the work followed should be noted and the reasons given. An article or short communication should be submitted as an email attachment in Microsoft Word (.doc, .docx or .rtf). Only short items, such as letters, will be accepted in non-electronic, paper form. Illustrations, including photographs, line drawings and graphs, should be submitted initially as separate files in .jpg, .tif or .eps format. Once a paper is accepted, the editors may ask for illustrations to be submitted in another format. Authors of accepted full papers and short communications receive a PDF copy of their article gratis. Any paper copies, charged at cost, should be ordered when the submission is accepted.

Please send all contributions to darcyogada@yahoo.com or djpearson@dsl.pipex.com

Rare birds in East Africa

Records of rare birds from Kenya, Tanzania and Uganda are assessed by the East Africa Rarities Committee. Records from other countries in the region can also be submitted for review and possible publication in *Scopus*. A full account of the record should be sent to the *Scopus* editors and to Nigel Hunter, Secretary, East Africa Rarities Committee, email: nigelhunter@timbale.org or mailed to him at P.O. Box 24803, Karen 00502, Nairobi, Kenya.

Ringing scheme of eastern Africa

This covers several countries in the area. Qualified and aspiring ringers should contact the ringing organizer, Bernard Amakobe, Ornithology Section, Zoology Department, National Museums of Kenya, P.O. Box 40658, G.P.O. 00100, Nairobi, Kenya; tel. +254 20 3742161 ext. 243; email: scopumbre05@gmail.com

EANHS Nest Record Scheme

Details of most kinds of breeding activity are welcomed by the scheme and nest record cards may be obtained free of charge from the Nest Record Scheme organizer, EANHS, Nature Kenya, P.O. Box 44486, G.P.O. 00100, Nairobi, Kenya; email: office@naturekenya.org

The East Africa Natural History Society

Nature Kenya

P.O. Box 44486, G.P.O. 00100, Nairobi, Kenya, tel. +254 20 3749957, fax +254 20 3741049; email: office@naturekenya.org

Nature Uganda

P.O. Box 27034, Kampala, tel. +256 (0) 41540719, fax 533528; email: eanhs@imul.com

Wildlife Conservation Society of Tanzania

P.O. Box 70919, Dar es Salaam, tel. +255 (0) 22 211 2518 / 211 2496, fax +255 (0) 22 212 4572; email: wcst@africaonline.co.tz

The BirdLife International Partnership in eastern Africa

Through its national partners, the BirdLife International Africa Partnership Secretariat in Nairobi co-ordinates bird conservation work in the region and produces several publications of interest to ornithologists.

Ethiopian Wildlife & Natural History Society

P.O. Box 13303, Addis Ababa, Ethiopia; tel. +251 (0) 2183 520; email: ewnhs@telecom.net.et